CORNELL EXTENSION BULLETIN 815

# Care and Adjustment of the SEWING MACHINE

A publication of the
New York State College of Agriculture,
a unit of the State University of New York,
at Cornell University

## Contents


| | PAGE |
|---|---|
| General information | 5 |
| Use of tools | 5 |
| Taking a machine apart | 5 |
| Cleaning a machine | 7 |
| Oiling | 7 |
| Reassembling a machine | 7 |
| Adjustments | 8 |
| Routine cleaning and oiling | 8 |
| Tools and supplies needed | 8 |
| Taking the machine apart | 8 |
| Cleaning the head | 15 |
| Oiling the head | 15 |
| Motor lubrication | 18 |
| Oiling the stand | 21 |
| Minor adjustments | 21 |
| Major cleaning and oiling | 22 |
| Tools and supplies needed | 23 |
| Taking the machine apart | 23 |
| Cleaning the head | 24 |
| Locating the bearings | 25 |
| Oiling the head after cleaning | 26 |
| Cleaning, adjusting, and oiling the stand | 34 |
| Reassembling the machine | 36 |
| Threading the machine | 37 |
| Winding the bobbin | 38 |
| Adjusting the machine | 38 |
| Adjustments to eliminate noise | 38 |
| Adjusting the needle | 39 |
| Adjusting the thread-take-up spring | 41 |
| Adjusting the feed dog | 44 |
| Adjusting the presser foot | 45 |
| Adjusting the shuttle and shuttle carrier | 45 |
| Adjusting tensions | 46 |
| Adjusting the bobbin winder | 49 |
| Adjusting the clutch | 50 |
| Kinds of clutches | 50 |
| Friction type of clutch | 53 |
| Jaw type of clutch | 54 |
| Adjusting the belt | 54 |

Special features of new machines ..... 54
Running the machine ..... 55
Summary of sewing-machine troubles—cause and remedy ..... 57
Machine runs hard ..... 57
Machine makes an imperfect stitch ..... 58
Cloth does not feed through machine ..... 58
Machine skips stitches ..... 59
Threads break ..... 59
Stitches loop on bottom of cloth ..... 61
Cloth puckers ..... 61
Stitches are staggered ..... 61
Machine sets ..... 62
Machine will not run at slow speed (motor-driven only) ..... 62
Stitch length ..... 63
Enamel on machine turns gray ..... 63

# Care and Adjustment of the SEWING MACHINE

F. B. Wright and Harold Clough[1]

## General Information

Every well-made sewing machine, new or old, can be maintained to run easily and to sew perfectly. For easy running a machine must be clean and well oiled, and the bearings must be adjusted so that they do not bind. For perfect sewing, certain adjustments, such as tensions, timing, and length of needle, must be correct.

Noise in operation is due mostly to loose bearings. On long-shuttle machines, noise may also be due to too much play between the shuttle carrier and the shuttle.

It is the purpose of this bulletin to give instructions (1) for routine care, (2) for major cleaning and oiling, (3) for adjustments, and (4) for trouble that may develop on the family sewing machine.

### Use of tools

A few simple tools are essential. To do a good job, tools must be correctly used. The correct use of screwdrivers is illustrated in figure 1. As there are several sizes of screws on sewing machines, it is important to have several sizes of screwdrivers, particularly for a major overhauling job. A good assortment of sizes is shown in figure 20.

The correct use of wrenches is illustrated in figures 2 and 3. The jaws of a wrench should fit the nut exactly. *Never use pliers on a nut.*

### Taking a machine apart

Before removing any part from a machine, look at it carefully to see how it is attached and try to remember how it should be replaced. It is always easier to take a machine apart than it is to put it back together correctly.

**As parts are removed place them in a pie tin or some other container so they will not be lost.** This is especially important for small screws and other small parts.

[1]The first edition of this bulletin was written by Professor B. B. Robb, now Professor Emeritus. The present revision was prepared by Professor F. B. Wright and Mr. Harold Clough, of the Department of Agricultural Engineering, at Cornell University.

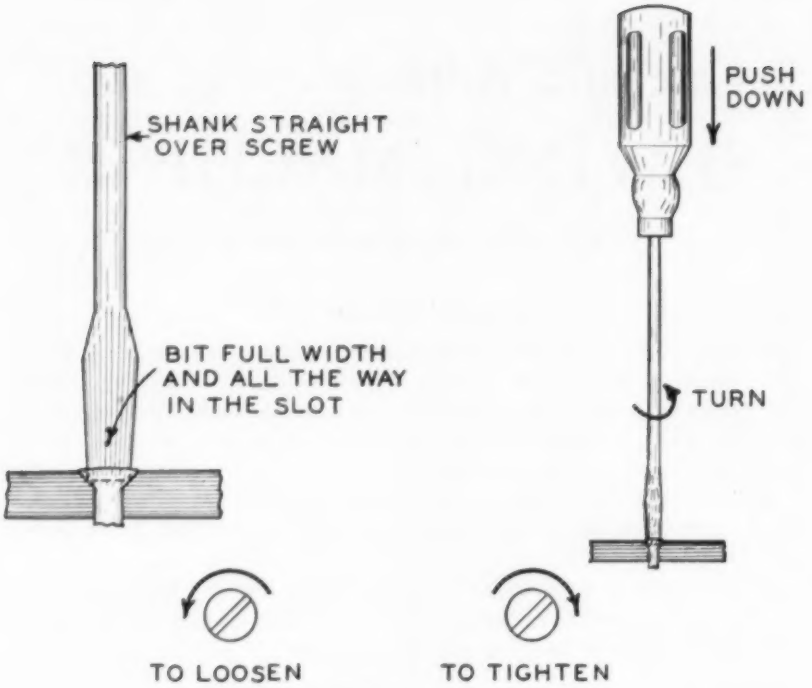



*Figure 1.* **Correct use of a screwdriver**

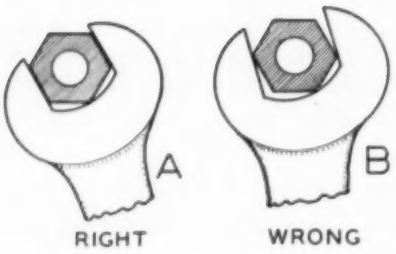



*Figure 2.* **Use of an open-end wrench**
The jaws of a wrench should fit the nut exactly as shown at A. A wrench too large, as at B, chews the corners off the nut.

### Cleaning a machine

Lint, dust, and scraps of thread in a machine can best be removed with a small *clean* paint brush *used dry*. Pick out, with a small crochet hook, a needle, or some other pointed instrument, any lint or thread that cannot be brushed out.

After dry-brushing as above it may be necessary to use a cleaning fluid to remove oil, grease, and gum from the working parts. *Do not use gasoline.* "Cleaning fluid" as referred to in this bulletin is a Stoddard solution, sold under various trade names. Your gasoline or hardware dealer may have it or may be able to get it.

If no Stoddard solution is available, use kerosene but keep the room well ventilated and do not smoke or use any open flame, such as a lighted stove, gas burner, or kerosene lamp.

Detailed directions for the use of cleaning fluids is given on page 7.

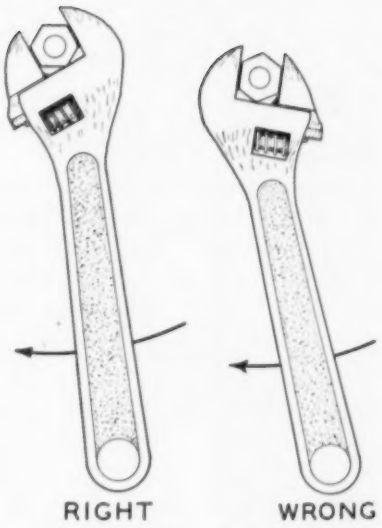



***Figure 3.* Use of an adjustable wrench**

The jaws of an adjustable wrench should be adjusted to fit the nut exactly. On nuts that are hard to turn, always place the wrench on the nut so that the pull will be toward the adjustable jaw as shown at the left.

### Oiling

A sewing machine, like an automobile, runs better and lasts longer if it is regularly cleaned and oiled. Most manufacturers supply an instruction book with each machine, which gives directions for care and adjustments. If you have no instruction book, you may be able to obtain one by writing to the manufacturer of your machine or by inquiring at your local dealers. Be sure to give the name and serial number of the machine. If an instruction book is not available, follow the instructions on pages 15, 21, and 26 to 36 of this bulletin.

For routine oiling of a machine, always use the *exact amount* and the *kind* of oil recommended by the manufacturer. If special greases or oils are specified, do not use substitutes. If one drop of oil is called for, use only one drop. Over oiling is almost as bad as not oiling at all. Generally speaking, frequent light oiling keeps a machine in the best condition.

### Reassembling a machine

The reassembling procedure should be approximately the reverse of the

order of taking apart. If you encounter any difficulty, refer to your instruction book or get help from an experienced person. Be sure to replace all screws, nuts, and bolts correctly and to screw them up as tightly as they should be.

**Adjustments**

Adjustments on tensions, needle, presser foot, bearings, and the like, should be made as directed in the instruction book or as directed on pages 38 to 54 of this bulletin.

## Routine Cleaning and Oiling

IN GENERAL, a sewing machine should have a routine cleaning and oiling at least twice a year. If you use the machine a great deal, clean and oil it after every 15 to 20 hours of sewing. If the machine has stood idle for several months, oil it before you use it again. *Each time before oiling be sure to remove all lint and dust from the working parts around the shuttle and behind the face plate.*

### Tools and supplies needed

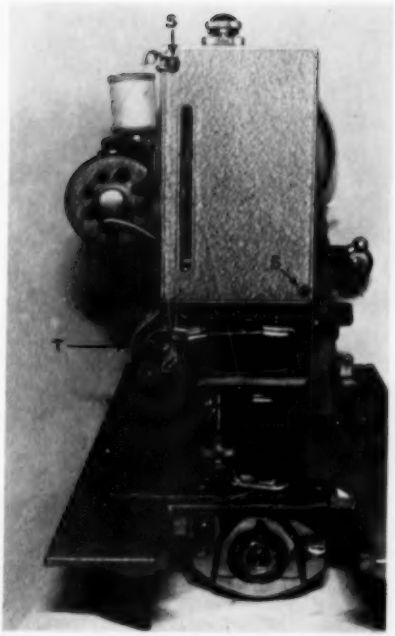
Items numbered 1, 2 or 3, 8, 10, 14, 16 or 17, 18, and 21 of figure 20 on page 22 are needed.

### Taking the machine apart

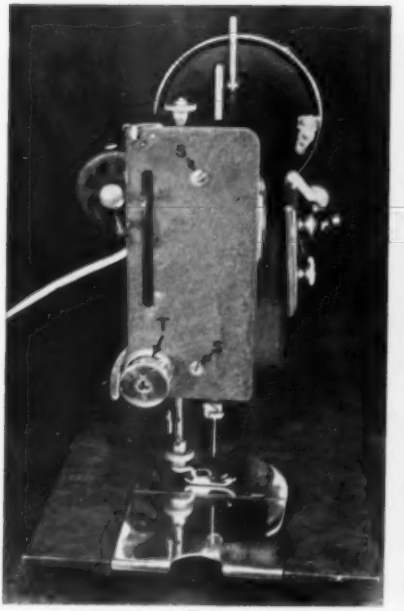
1. Unthread the machine and take off the shuttle slide plate. On long-bobbin machines, remove the shuttle and the bobbin. On round-bobbin machines, take out the bobbin. Machine parts are indicated in figures 12, 13, 21, and 24 to 31.
2. Remove the needle plate (sometimes called the *throat plate*) and the arm plate, if there is one on your machine. If your machine has a face plate as shown in figure 4, remove it to give access to the working parts. If the upper-tension assembly is on the face plate, as shown in figure 4B, do not disturb or remove it from the face plate. Some of the newer machines have a hinged face plate, as shown in figures 7, 24, 25, 27, 29, and 30. Opening these two covers gives access for cleaning and oiling. If the face plate is a part of the needle-bar housing, as shown in figures 5 and 6, remove the housing. *Do not take this type of needle-bar housing apart unless you are sure that you can put it back together again.*

Machines with removable arm covers are shown in figures 7, 24, and 27. Opening these two covers gives access for cleaning and oiling.

The machine illustrated in figure 28 has permanently lubricated bearings




A




B

C

***Figure 4.*** **Machines with removable face plates**

Screws marked *S* should be removed to take off the face plates. The tension device shown at *T* in B is attached to the face plates. Do not disturb this tension when you take the plate off. The tension device shown at *T* in A is separate from the face plate and must be removed separately if it needs cleaning or repairs. The tension at *T* in C is mounted on the front of the needle-bar housing.

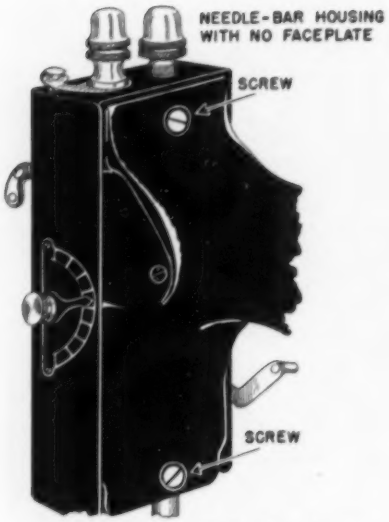



***Figure 5.*** **A needle-bar housing**
In this machine the needle and presser bars are held within the removable part of the housing

***Figure 6.*** **A split needle-bar housing with a flat needle bar**

and should not be oiled. The covers should, however, be removed occasionally for a thorough cleaning.

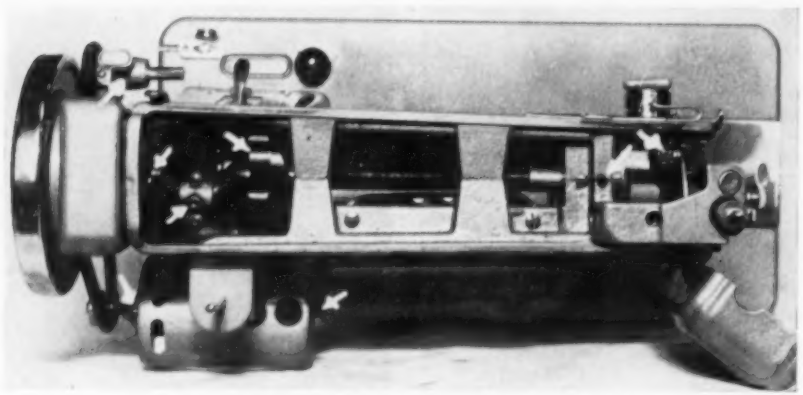


***Figure 7.*** **Top view of the machine shown in figure 24**
The arm cover has been removed and the hinged face plate opened. White arrows indicate points to oil.

*Figure 8.* **Machine with face plate, needle plate, and shuttle slide removed to show accumulation of lint and dust around working parts**
This lint and dust should be removed each time before oiling

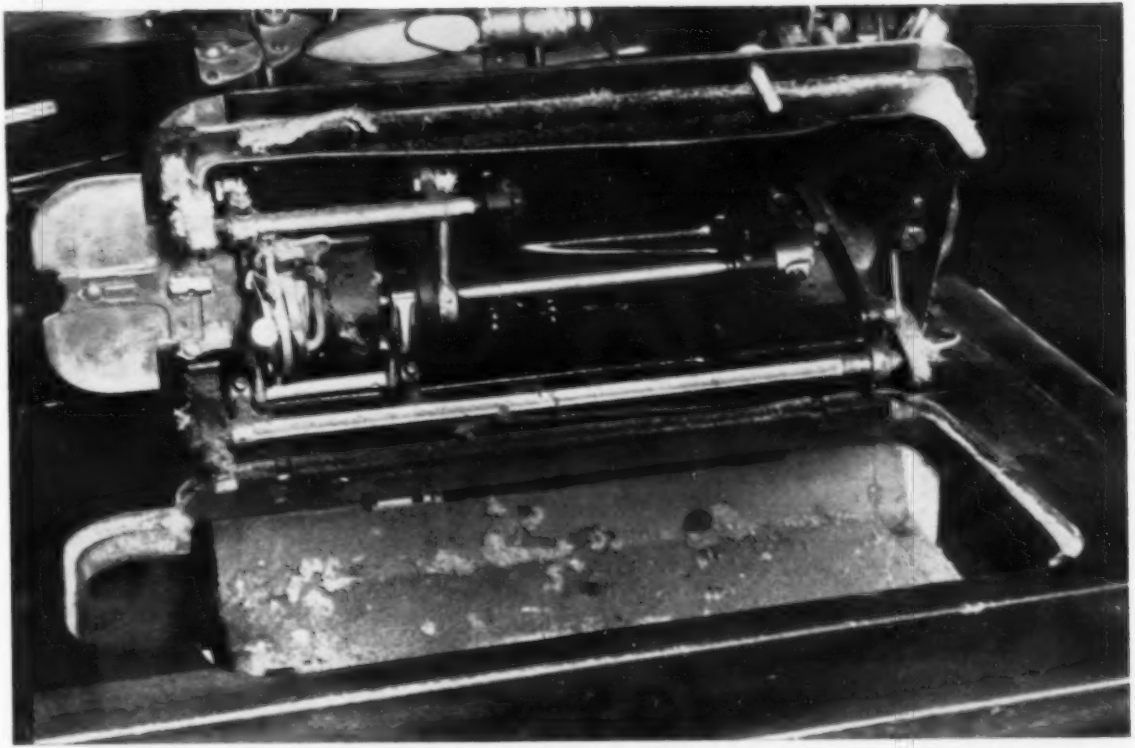


*Figure 9.* **Underside of a sewing-machine head showing accumulation of lint and dust on the working parts**

*Figure 10.* **A clean, small paint brush—the best tool to remove dry lint and dust**

***Figure 11.*** **Oiling a machine head after cleaning**
Add 1 or 2 *drops,* not squirts, of oil at each bearing.

## Cleaning the head

With the small paint brush, used dry, and with a small-pointed instrument, such as a stiletto or a fine crochet hook, remove all the accumulated dirt and lint from around the feed dog and from all other parts where dust and lint accumulate, including the parts underneath the head (figures 8, 9, and 10). *It is most important to keep lint from between the feed dog and the underside of the needle or throat plate.*

## Oiling the head

After cleaning as above, oil according to directions in your instruction book. If an instruction book is not available, study the illustrations in figures 7, 13, 19, 22 to 26, 27C, 29C, and 30, and note the indicated places to oil. Some machines (the one shown in figure 30 is an example) have the oil holes marked with red paint. If your machine is not of the type shown in the illustrations, turn the hand wheel slowly and observe every moving part in the upper part of the head and underneath. Wherever two parts rub together or rotate one within the other, place one or two drops (not squirts) of oil (figure 11). If there are oil holes in the head over hidden moving parts, as over the hand-wheel shaft and arm shaft (figure 13), place one or two drops of oil in these holes. On some machines, when oiling through holes in the

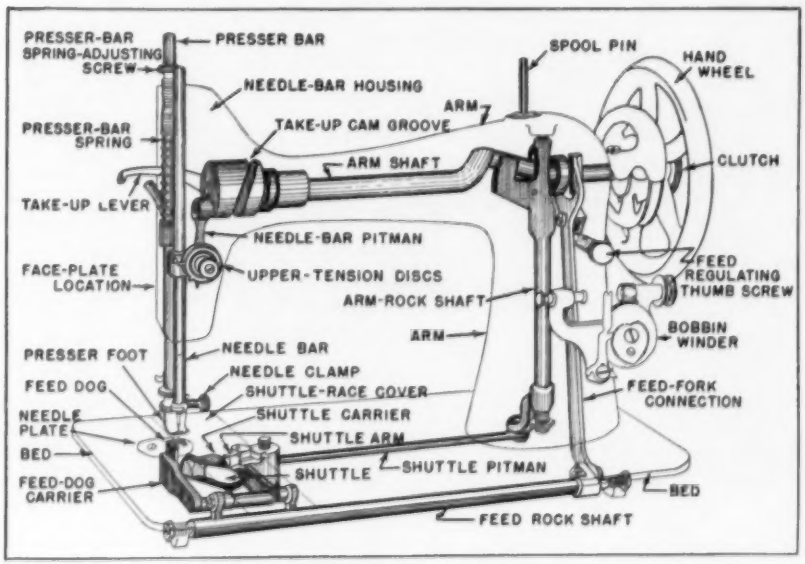
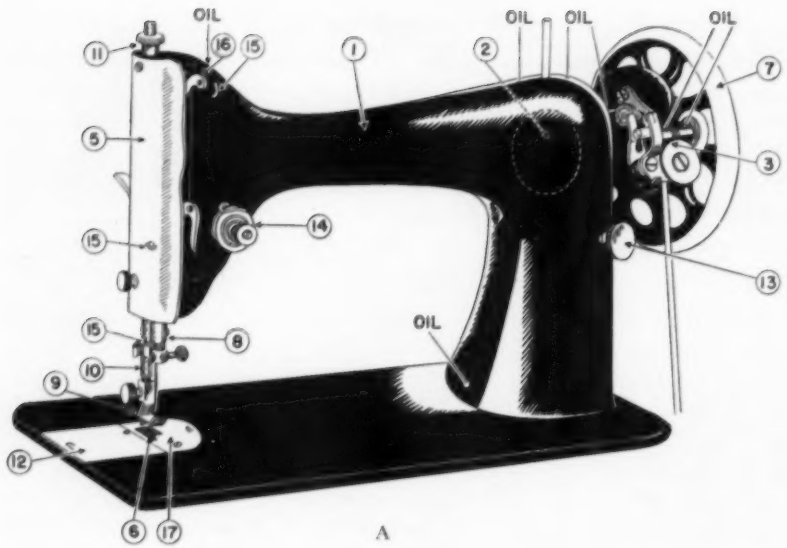
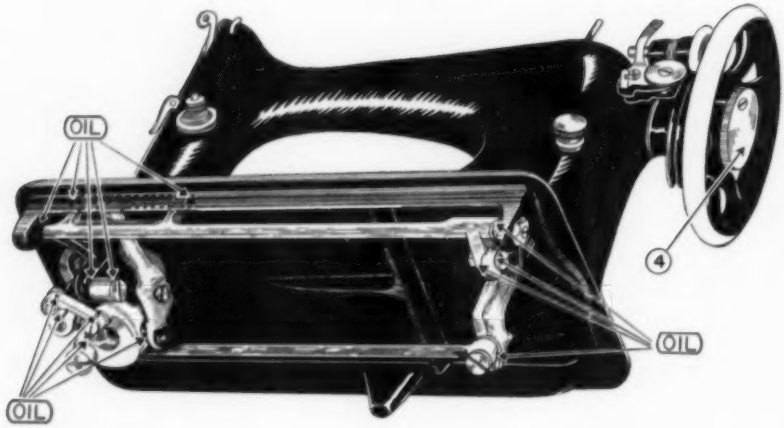



*Figure 12.* **Parts of one make of sewing-machine head**




A




B

*Figure 13.* **Parts and where to oil one type of sewing-machine head**

1. Arm
2. Armplate, or cover plate
3. Bobbin winder
4. Clutch
5. Face plate
6. Feed dog
7. Hand wheel
8. Needle bar
9. Presser foot
10. Presser bar
11. Pressure-control screw
12. Shuttle slide plate
13. Stitch-length control or regulator
14. Upper tension
15. Thread guides
16. Thread-take-up lever
17. Needle plate or throat plate

arm, it is important to have the machine set in a certain position, as with the take-up lever at its lowest point. To find the position for setting, refer to your instruction book.

Make sure that the oil finds its way into the bearing for which it is intended. Many of the bearings on a sewing machine do not have oil holes, but they need oil. Apply the oil to the top edge of these bearings, so it runs down into the bearings. With a soft cloth wipe off all excess oil. *Do not oil the tensions or the clutch of any machine.*

Shuttle races require only a very small amount of oil. If you use too much oil, it may get on the thread, soil the goods, and cause the machine to skip stitches. To oil the shuttle race of a long-bobbin machine, place *one drop* of oil on your finger and wipe the oil on the surface of the race. Some long-shuttle machines have an oil well with a small opening that leads to the

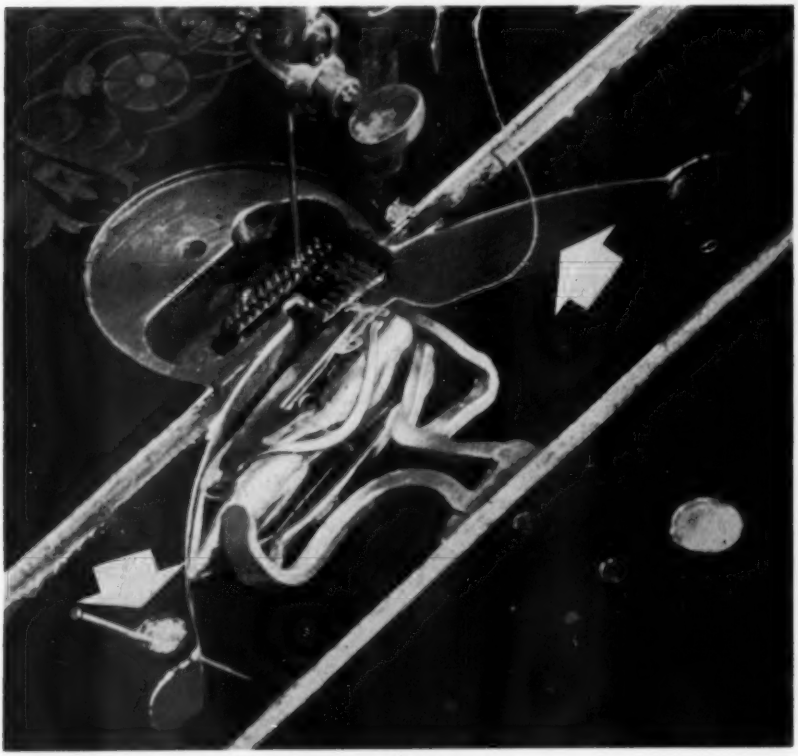


***Figure 14.*** **Long shuttle and its race**

Upper arrow points to the shuttle race (a bearing surface which must be lubricated). Lower arrow points to oil well filled with wool. When cleaning this type of machine, run a pin through the oil hole leading to the race as indicated.

shuttle race (figure 14). This oil well is filled with loosely packed wool to hold the oil and allow it to move slowly through a small hole to the shuttle race where it is picked up as the shuttle moves back and forth across the opening. Force a pin through this small oil hole to make sure it is open (figure 14).

Some round-bobbin machines have in the shuttle mechanism a piece of felt, usually red, on which to put several drops of oil to feed slowly to the wearing surfaces. Other round-bobbin machines have no special provisions for oiling the shuttle race. On such machines, put, with an oil-can spout or a toothpick, a small drop of oil on the wearing surfaces.

On some of the newer machines, certain bearings are packed with a light grease that resembles vaseline. These bearings as a rule should not be disturbed. If, however, after many years of service the grease in these bearings is not functioning because it has hardened or has been pushed out of place, repack the bearings, using grease recommended by the manufacturer. This is a *job for a mechanic and not for the average seamstress.*

A machine in which the bearings are either nylon or graphite-impregnated bronze is shown in figure 28. Such bearings should be thoroughly cleaned with a *dry* brush, but *should not be oiled or greased* unless specifically recommended by the manufacturer.

## Motor lubrication

Motors on old machines usually are oil lubricated, while those on the new machines are grease lubricated. For the grease-lubricated motor, special

***Figure 15.*** **A motor with porous bronze bearings**

This motor has self-aligning porous bronze bearings, one at each end, surrounded by a felt wick that supplies oil to the porous bronze to lubricate the shaft. One large or two small *drops* of oil added to this wick on each bearing once a year is enough. Allow the oil to drip from the spout of an oil can into the oil holes at the top of the bearing as shown at arrows.

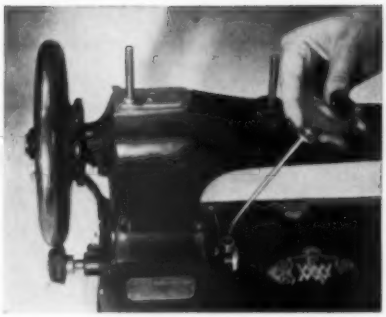


***Figure 16.*** **A motor with oil cups, one on each end, on the top of the bearings**

A small piece of wool yarn or felt is placed in the bottom of each cup to hold the oil and feed it slowly to the bearings. Two *drops* of oil in each cup once or twice a year is enough for this motor.

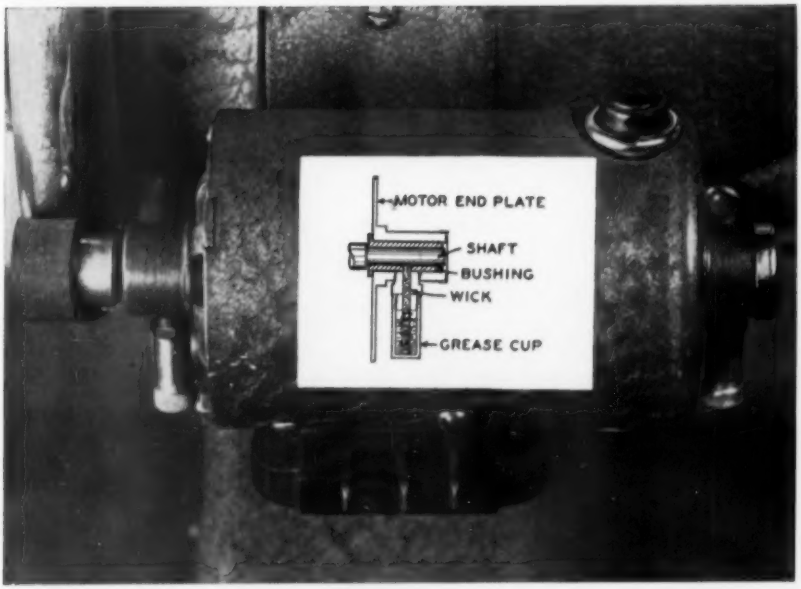



***Figure 17.*** **A motor with two lubricant reservoirs or cups, one on each end and underneath the bearing**

Each reservoir or cup contains a wick as shown in the line drawing.

To lubricate, unscrew the cup, clean out the old grease or oil, and wipe off the wick. If a glaze has formed on the upper end of the wick, scrape it off. Then refill the cups with motor lubricant or place several drops of oil on the wick and fill the cup about one-fourth full of oil, insert the wick, and replace the cup on the motor. Be sure that the upper end of the wick enters the hole in the bearing. Wipe off any excess oil on the outside of the cup and motor.

motor-bearing grease is available in tubes (figure 20, No. 6).

Motors should be lubricated about once a year. For oil-lubricated bearings, use nothing but a good quality of new, clean, light oil such as SAE 10 or lighter. Oil sparingly; usually one or two drops (not squirts) to the bearing, is enough. Overoiling may ruin the motor. For grease-lubricated bearings, fill the grease cups once a year.

Oil-lubricated motors are shown in figures 15 and 16. Either an oil- or grease-lubricated motor is shown in figure 17, and those in figures 18 and 19 are grease lubricated.

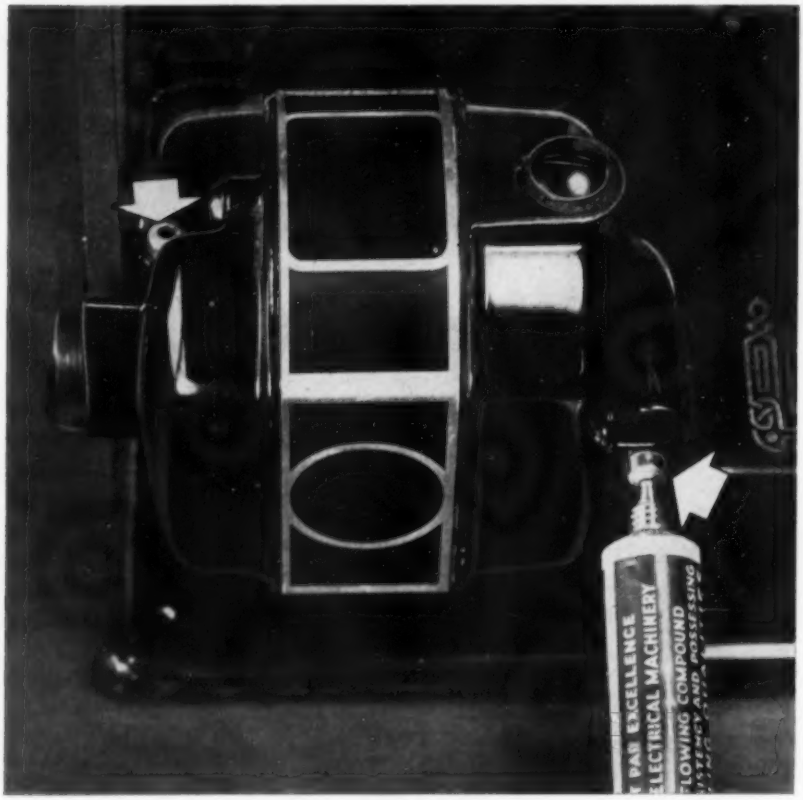



***Figure 18.*** **A motor with grease points**

(One is on top near the belt.) A special lubricant in a tube is essential for this motor.

To lubricate, insert the tip of the tube in the grease point and squeeze lightly until the hole is full of grease.

***Figure 19.*** **A motor with a worm gear drive packed in grease at the factory**

The motor bearings should be lubricated once a year. Turn the machine head back as shown. Remove the two screws at the bottom of the grease cups and clean out all the old grease. Insert the tip of the tube of lubricant into each cup and squeeze about a quarter of it into each cup. Then replace and tighten the thumbscrews.

## Oiling the stand

If your machine is treadle-operated, the bearings should be clean and oiled as directed on pages 34 to 36 of this bulletin.

The above cleaning and oiling should keep your machine in good working order for many years.

## Minor adjustments

Minor adjustments that may be required from time to time after routine cleaning and oiling can be made according to instructions given on pages 38 to 54.

When you have finished oiling and adjusting your machine, sew some waste material to absorb any excess oil that may be left around the shuttle

or feed works, or any that has found its way down the needle bar onto the needle. Then leave some material under the presser foot, with the presser foot down and the needle through the material.

## Major Cleaning and Oiling

ANY machine after extended use is likely to need a thorough cleaning with cleaning fluid to remove old oil, gum, and dirt. After such a cleaning, a machine should be thoroughly oiled. The following directions are for such a major cleaning and oiling.

***Figure 20.*** **Tools and materials needed for major cleaning, oiling, and adjusting sewing machines**

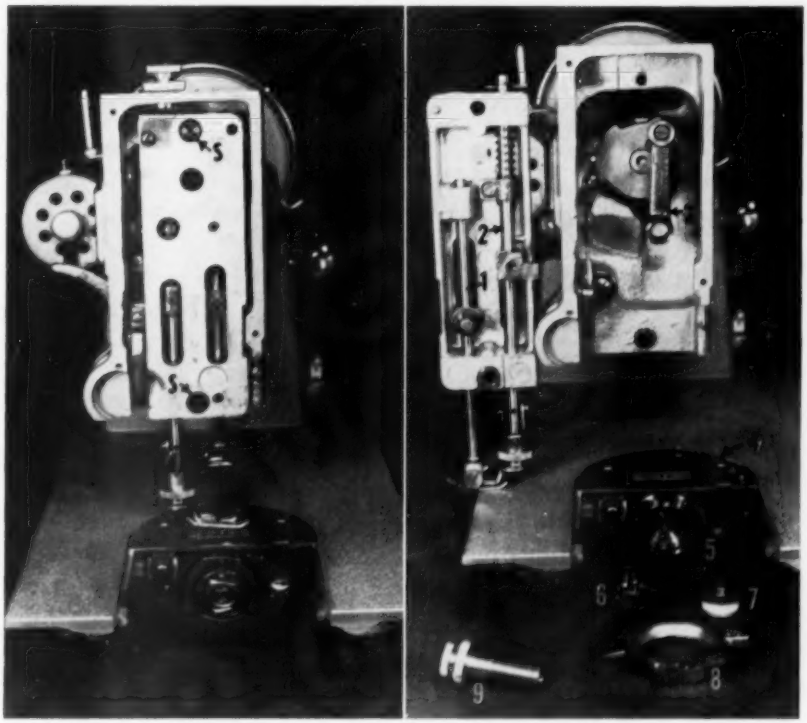
1. Soft cloths or cotton waste
2 and 3. Two types of cans for sewing machine oil. Both are not needed, but the one with a long spout is more convenient for reaching hard-to-get-at places
4. Can of cleaning fluid (Stoddard solution, not gasoline)
5. A large oil can for squirting cleaning fluid into bearings
6. Tube of grease for motor bearings
7. Can of gear lubricant (for machines having gear drives)
8. Scrap cloth for testing tension
9. 8-inch adjustable-end wrench
10. Small-paint brush
11. Adjustable nose pliers
12. Old tooth brush to scrub gum from parts
13. Knife to scrape gum
14. Old newspaper
15, 16, 17, 19, and 20. Screwdrivers
18. Fine crochet hook
21. Pie tin for parts and cleaning fluid

## Tools and supplies needed

Tools and materials needed are indicated in figure 20.

## Taking the machine apart

1. Place the machine where good light is available. If the machine is a portable model, a sturdy table or a work bench is needed on which to place the machine. Place several layers of old newspapers under the machine to catch the dirt and oil. If there is a rug on the floor, roll it




A B

***Figure 21.*** **Needle-bar housing on one type of machine**

At *A*, the face plate of figure 4 A removed. Removing screws *S* frees the needle-bar housing for removal as shown at *B*. At *B* the numbered parts are as follows:

1. Needle bar
2. Presser-foot bar
3. Connecting rod for needle bar
4. Needle plate
5. Shuttle or hook
6. Bobbin case
7. Bobbin
8. Shuttle-race cover
9. Presser-foot-spring adjusting screw

back or cover it carefully. On cabinet machines, place a folded newspaper underneath the head.

2. Unthread the machine and take out the bobbin. Place the thread and bobbin away from cleaning fluid and oil.

3. Remove the following parts and place them in a pie tin.[2]
(For names of parts, refer to figures 12 and 13 for older machines and to figures 21 to 30 for new machines.)

   1. Needle
   2. Presser foot
   3. Shuttle slides or bobbin cover
   4. Shuttle
   5. Needle plate
   6. Arm plate, if any
   7. Arm cover, if any (figures 7, 24, 25, and 26)
   8. Face plate, if any, except hinged type
   9. Base plate, if any (figure 30)
   10. Bottom cover, if any
   11. Over-all covers, if any (figure 28)
   12. Needle-bar housing, if any (figures 5, 6, and 21)
   On machines without a face plate, do not take the needle-bar housing apart *unless you are sure you can reassemble it correctly.*
   13. If the machine is electrically driven, remove the motor or take particular care to protect it and all wiring from the cleaning fluid. Never wash the motor with cleaning fluid and *do not flood the bearings with oil.*

### Cleaning the head

1. With the paint brush, used dry, brush off all of the lint and dirt that you can reach. Clean the stand or cabinet parts, if any.

2. With a crochet hook (or some other pointed instrument) remove all loose lint and dirt from around feed dog, shuttle, and other recesses not accessible with the paint brush. Clean out all oil holes (figures 13 and 14). Some oil holes have felt wicking (usually red in color) to hold the oil. Some of the oscillating shuttle machines have a piece of red felt in the shuttle case to distribute oil to the shuttle race. Brush this felt to remove lint and dirt, add a few drops of oil but *do not remove the felt.*

[2] Soak with cleaning fluid, kerosene, or penetrating oil for a few minutes, any screws that are corroded and will not loosen easily, then set a screwdriver in the slot and tap sharply a few times with a hammer to loosen the corrosion.

Certain of the newer machines have, under the base, long oil wicks that lead to several bearings. Do not disturb these wicks. Brush off any accumulated lint and apply fresh oil to the wicks. All other felt wickings should be removed, rinsed with cleaning fluid, and laid aside to dry until the machine is ready for reassembly.

3. Pour some cleaning fluid into a pie tin. Wet a small, *clean* paint brush with the cleaning fluid and scrub vigorously all the parts in and about the needle-bar housing. Clean thoroughly around the feed mechanism and, in round-bobbin machines, clean thoroughly the shuttle case and the shuttle-driving mechanisms. Then turn the head of the machine back, and thoroughly clean all the underparts of the machine by scrubbining them hard with a brush wet with cleaning fluid. An old toothbrush is good for this.
4. If any of the bright parts are coated with a yellowish varnish-like material, scrape this off with a knife or screwdriver. Do not scrape off any paint. Clean all of the parts that can be reached around the bobbin winder, around the hand wheel, and inside the arm of the machine. Lastly, clean the parts that were placed in the pie tin and let them dry until they are wanted for reassembling.
5. In the long-bobbin machine, wipe the shuttle race with a piece of cloth wet with cleaning fluid. Many machines of this type have an oil well about ¼ inch in diameter underneath the front shuttle slide and near the front end of the shuttle race (figure 14). This oil well is filled with wool or some other oil-holding material. Remove this wool and cleanse it thoroughly. A small hole about the size of a pin leads from the oil well to the shuttle-race. Force a pin through this hole to be sure it is open (figure 14). Replace the cleaned oil-holding material or insert new. If raw wool is not available, use wool yarn.
6. Having brushed, scrubbed, and scraped the machine clean, the next step is to wash out the bearings (except the nylon and permanently lubricated bronze bearings as in the machine of figure 28). To do a good job of washing out the bearings, you must know where all of the bearings are located.

### Locating the bearings

A bearing is a place where one part turns within or rubs against another part (figures 13, 14, and 22 to 31). Whenever metal rubs against metal, it causes friction that results in wear. A film of oil between these rubbing surfaces separates them and thus reduces both friction and wear and results in easy running. To find the bearings, proceed as follows:

Study the oiling chart in your instruction book, or refer to the above

figures and note the exact location of each bearing. The machine of figure 30 has the oil holes marked with red paint.

Turn the hand wheel slowly by hand, at the same time observe the many moving parts to find the bearing or bearings supporting each. Next, tip the head of the machine back as shown in figure 13B and find the bearings underneath the bed of the machine head. On some machines there is either a sliding bearing or a pivot bearing in the vertical part of the machine arm at your right (figures 22 and 23). When you have located the bearings, run the machine and at the same time, with an oil can (5 in figure 20), squirt a liberal amount of cleaning fluid into each oiling place and on each bearing or moving part. Be sure that each bearing is well filled with the cleaning fluid. Continue to run the machine for a few minutes to work the fluid through the bearings. If the machine momentarily runs hard, there is dirt in one or more of the bearings; wash this out by continuing to run the machine and adding more cleaning fluid.

### Oiling the head after cleaning

Washing with cleaning fluid removes all of the oil from the working parts, but small amounts of cleaning fluid remain in the bearings. To flush out the cleaning fluid, put plenty of oil on all of the bearings which are supposed

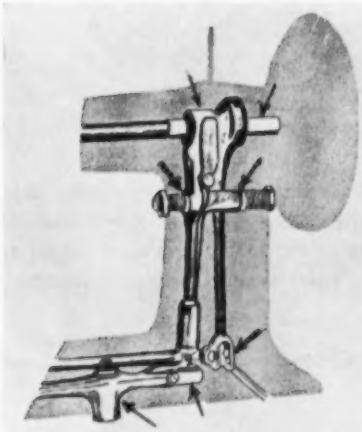


***Figure 22.*** **Bearings in vertical part of arm**

Make sure these bearings are oiled after cleaning. Arrows point to bearings.

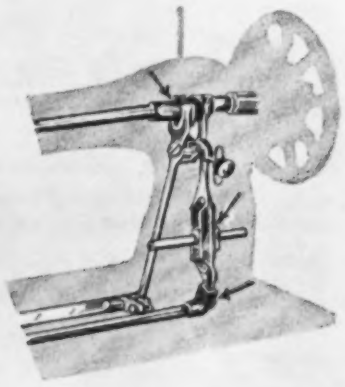
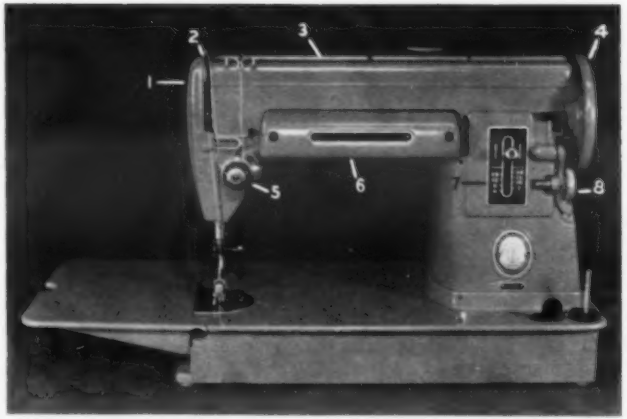
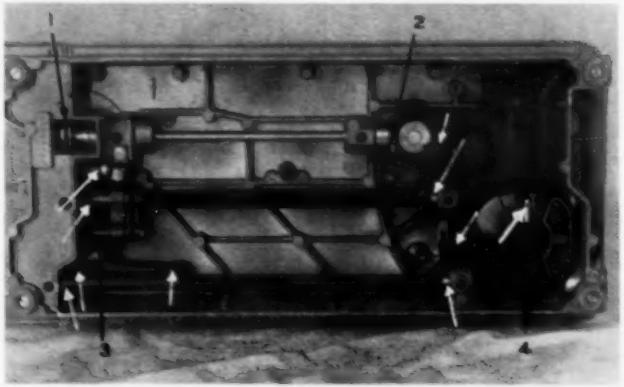


***Figure 23.*** **Sliding bearing in vertical part of arm**

Be sure bearings are oiled, especially after cleaning with fluid. Arrows point to bearings.




A




C

B

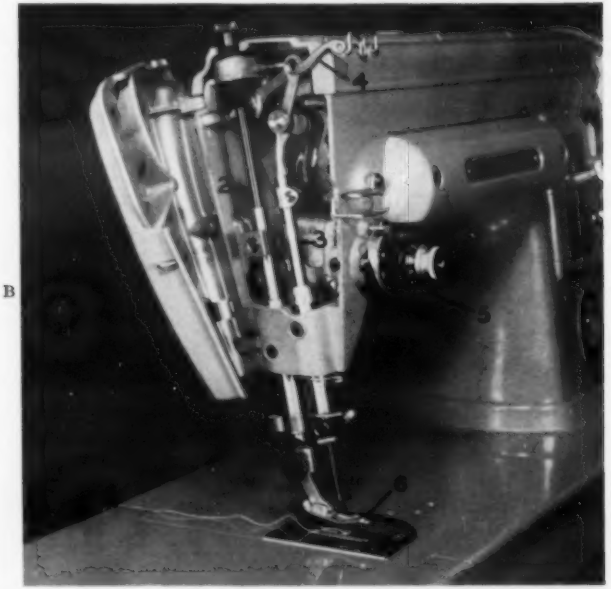
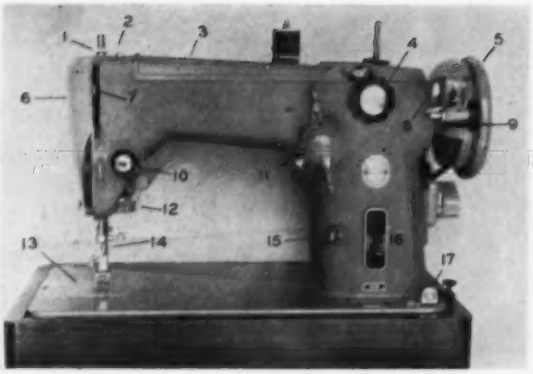



***Figure 24.*** **Modern machine with hinged face plate and removable arm cover**

*A. Front view:* (1) Hinged face plate. (2) Thread take-up lever. (3) Removable arm cover. (4) Hand wheel. (5) Upper tension. (6) Light. (7) Stitch-length regulator and reversing lever. (8) Bobbin winder.

*B. Needle-bar housing:* (1) Hinged face plate in open position. (2) Presser-foot bar. (3) Needle bar. (4) Thread take-up lever. (5) Upper tension. (6) Needle plate.

*C. Underside of head:* (1) Shuttle. (2) Beveled gear drive. (3) Feed-dog release screw. (4) Motor. (5) White arrows indicate points to oil.



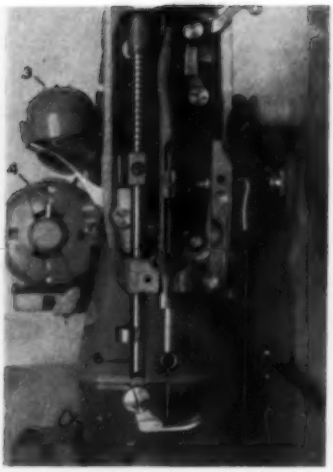



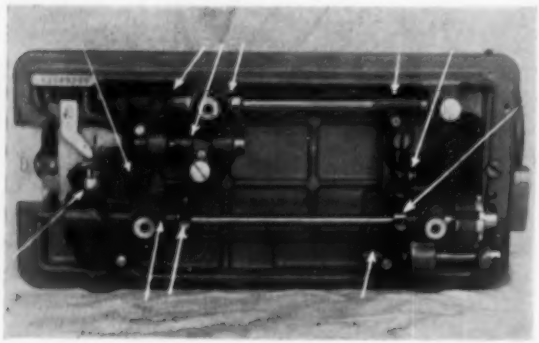

***Figure 25.*** **Modern machine with removable face plate and arm cover**

*A. Front view:*

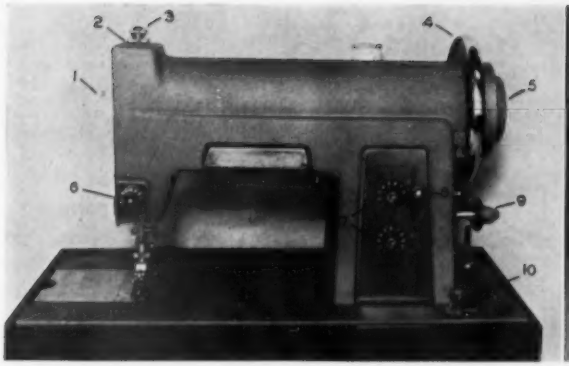
1. Presser-foot adjusting screw
2. Thread guide
3. Arm cover
4. Cam for special stitching (Fashion Disc)
5. Hand wheel
6. Face plate
7. Thread take-up lever
8. Bobbin winder automatic release
9. Bobbin winder
10. Upper-tension device
11. Needle position and bight control
12. Zig-zag mechanism
13. Needle plate or throat plate
14. Needle and presser foot bars
15. Stitch-length limit screw
16. Stitch-length regulator and reversing lever
17. Bobbin winding tension

*B. Needle-bar housing*

1. Presser-foot adjusting screw
2. Thread take-up lever
3. Light
4. Motor
5. Upper tension
6. Presser-foot bar
7. Needle bar
8. Presser foot
9. Feed dog

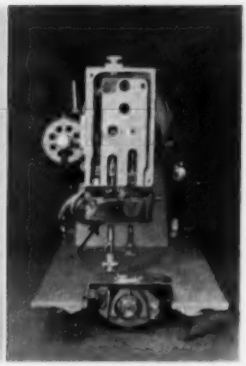


*C. Under side of head*
White arrows indicate places to oil




*A. Front view*

1. Thread take-up lever
2. Presser-foot adjusting screw
3. Presser-foot release knob
4. Hand wheel
5. Clutch knob
6. Upper tension
7. Stitch length regulators
8. Reverse shift lever
9. Bobbin winder
10. Bobbin-winder thread guide



*B. End view with face plate removed*

The arrow points to the upper tension device. It is not attached to the face plate.

*C. Underside of head*

The white arrows indicate places to oil.

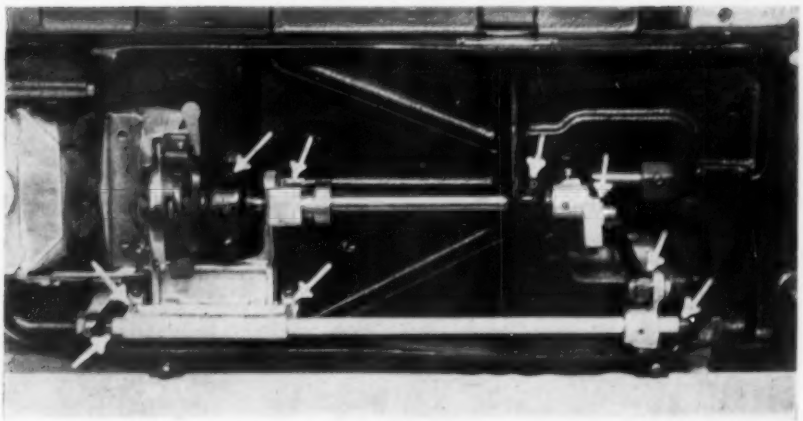
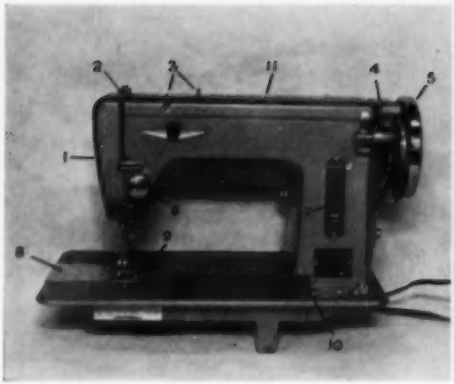
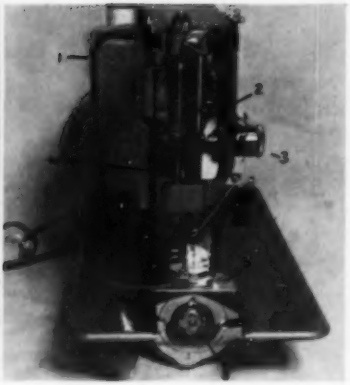


***Figure 26.*** **Modern machine with removable face plate and needle-bar housing**




*A. Front view*

1. Hinged face plate
2. Presser-foot adjusting screw
3. Thread guides
4. Bobbin winder
5. Handwheel
6. Upper tension
7. Stitch-length regulator and reversing lever
8. Shuttle cover plate
9. Needle plate
10. Feed-dog release knob
11. Removable arm cover




*B. Needle-bar housing*

1. Face plate
2. Needle bar
3. Upper tension
4. Presser-foot bar
5. Needle plate
6. Bobbin holder

*C. Underside of head*
White arrows indicate places to oil.

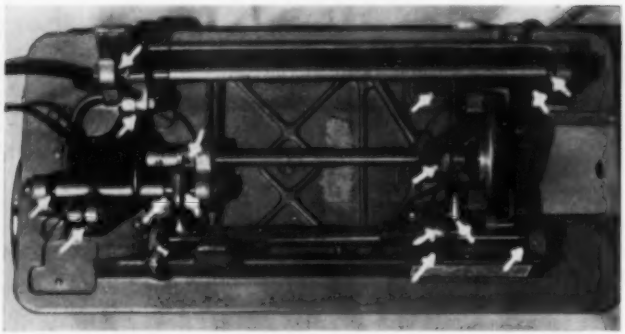
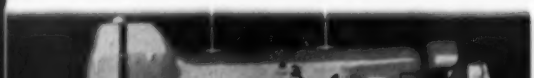


***Figure 27.*** **Modern machine with hinged face plate and removable arm cover**





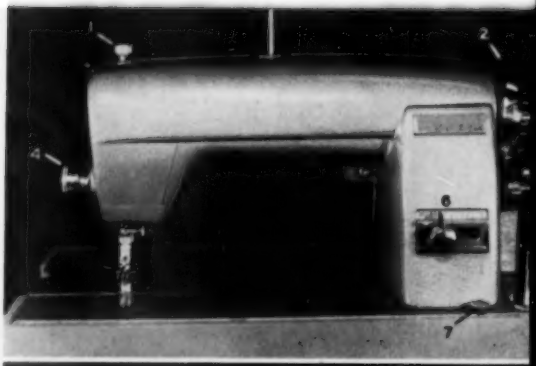
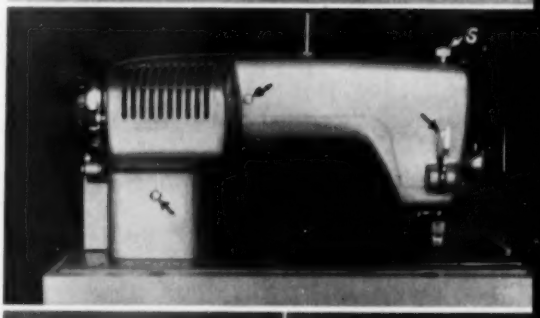



***Figure 28.*** **A modern machine without face plate but with over-all covers**

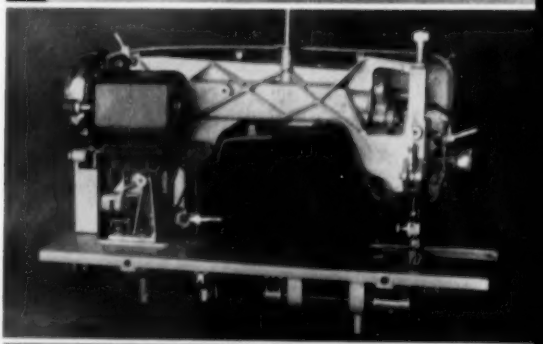
*A. Front view*

1. Presser-foot adjusting screw
2. Hand wheel
3. Clutch knob
4. Upper tension
5. Bobbin winder
6. Stitch-length regulator and reversing lever
7. Hold-down screw



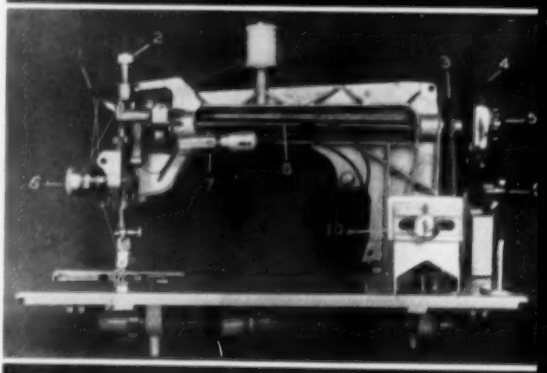

*B. Back view*

Arrows indicate screws to remove to take off back cover.



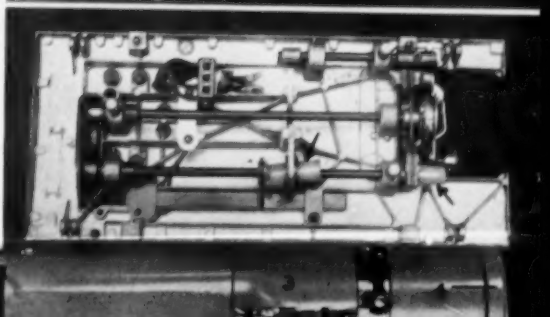
*C. Back view with back cover removed*

Arrows indicate screws that must be removed to take off front cover.



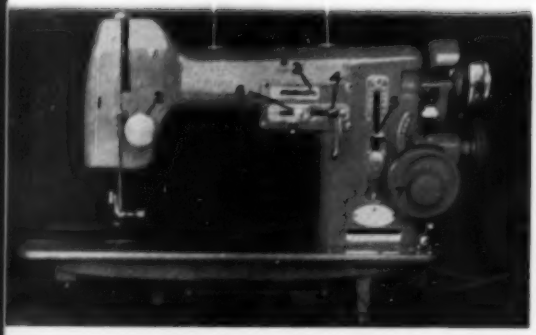

*D. Front view with both covers removed*

1. Thread take-up lever
2. Presser-foot adjusting screw
3. Chain drive
4. Hand wheel
5. Clutch knob
6. Upper tension
7. Light
8. Arm shaft
9. Bobbin winder
10. Stitch-length regulator



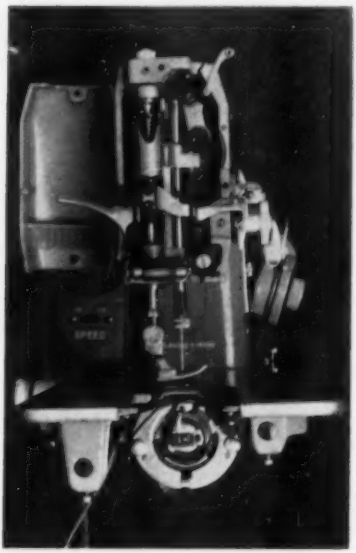
*E. Underside of head*

Arrows indicate nylon parts. The bearings are permanently lubricated.

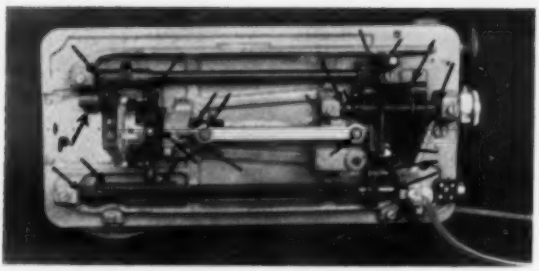


*A. Front view*

1. Hinged face plate
2. Upper tension
3. Zig-zag position lever
4. Zig-zag stitch lever
5. Stitch-length regulator and reversing lever
6. Index stop screw
7. Bobbin winder



*B. Needle-bar housing and shuttle*



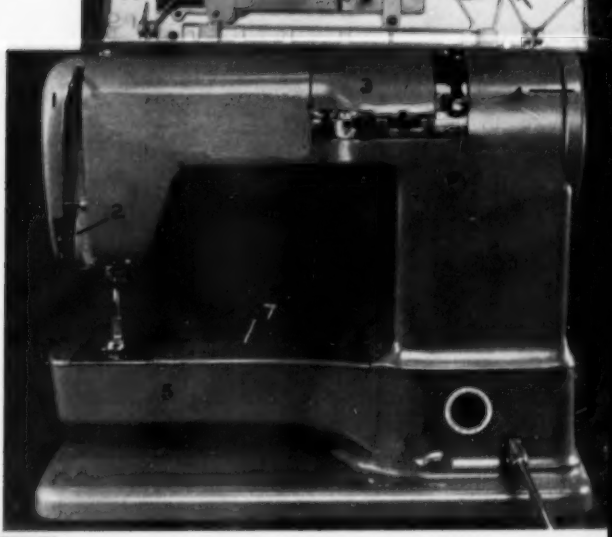
*C. Underside of head*

Arrow P indicates feed-dog release lever. Other arrows indicate places to oil.

***Figure 29.*** **Modern machine with hinged face plate and controls for special stitching**

*A. Front view*

1. Hinged face plate
2. Upper tension
3. Cam and stitch-regulator housing (see figure 54 for details)
4. Hand wheel
5. Darning arm
6. Knee bar
7. Base plate



*B. Needle-bar housing*

*C. Shuttle-operating mechanism within the darning arm*

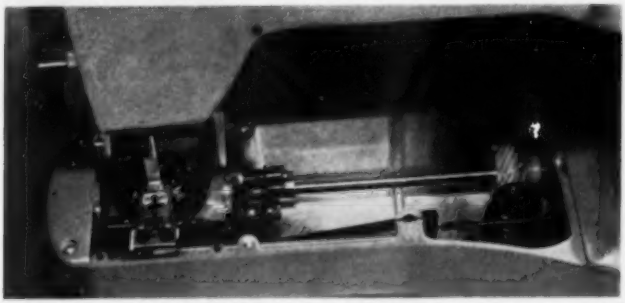


***Figure 30.*** **Modern machine with hinged face plate and a set of cams for special stitching**

Note arm type of construction of base which permits easy darning, the sewing of sleeves, and the like.

to be oiled. Make sure that the parts in the vertical part of the machine arm are oiled. *Do not oil the tensions or clutch and do not flood the motor bearings.* Run the machine for a few moments and then wipe off the excess oil with a cloth.

The next time you oil the machine, proceed as directed for routine oiling on pages 15 to 21.

### Cleaning, adjusting, and oiling the stand

If your machine is treadle operated, clean and oil the treadle mechanism regularly:

1. Place newspaper under the stand to protect the rug or floor.
2. The treadle, pitman, and band-wheel bearings readily collect lint and

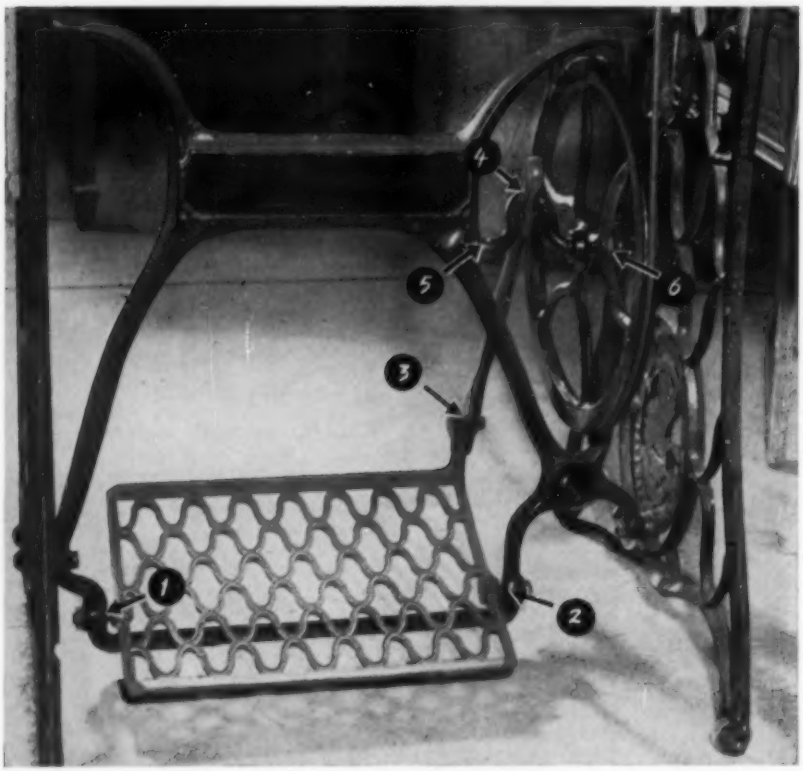



***Figure 31.*** **Treadle mechanism**

Numbers show the location of adjustable bearings that need to be oiled: 1 and 2, treadle bearings; 3 and 4, connecting-rod bearing; 5 and 6, band wheel bearings.

dust and pick up loose threads which often wind into the bearings and cause the machine to run hard. There is a bearing at each end of the treadle, one at each end of the pitman or connecting rod, and either one or two bearings supporting the large band or drive wheel (figure 31).

With the paint brush used dry, remove all loose lint and dust from the treadle parts. With a small screwdriver or some other pointed instrument, remove any lint or threads from the five or six bearings. If dirt or gummy oil has collected in any of these bearings, you may need to clean them with cleaning fluid. As soon as the bearings are clean and dry, oil each and wipe off any excess oil.

2. Remove the belt from the large band wheel and operate the treadle. If it runs hard, probably there are still some threads wound in one or more of the bearings; usually it is the band-wheel bearing. Check these bearings again to be sure that *all* threads are removed.
3. If the treadle is noisy, one or more of the bearings are loose. Rocking the treadle back and forth lightly will usually reveal the loose bearing by the noise it makes. To tighten treadle bearings proceed as indicated in figure 32.

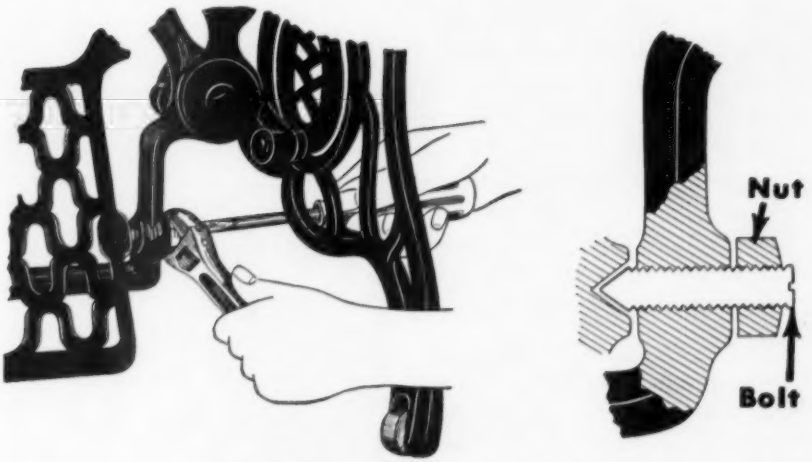



***Figure 32.*** **How to tighten a treadle bearing**

Details of bearing are shown at the right. To tighten the bearing:

1. Adjust the wrench to fit the nut (figures 2 and 3).
2. While holding the bolt with a screwdriver, loosen the nut.
3. Turn the bolt in until it binds slightly, then loosen until free. While holding the bolt in that position, tighten the nut.
4. Check the bearing for tightness. If not tight enough, repeat steps 1 to 3 until the bearing is just snug enough to eliminate noise. Too tight a bearing makes the machine run hard.

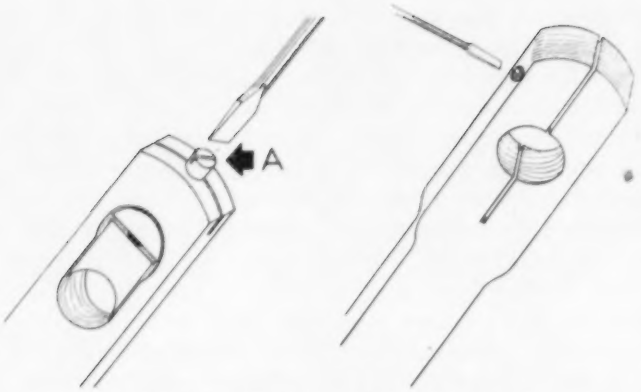



***Figure 33.*** **Wood connecting-rod bearings**
To adjust, tighten the screw indicated by the screwdriver.

To tighten wooden connecting-rod bearings, proceed as in figure 33. Tighten them just enough to eliminate the noise but not enough to make them bind. Do not attempt to tighten ball bearings on connecting rods.

After tightening the bearings, the band wheel should spin easily and come to rest by balancing back and forth at least once.

4. After cleaning and tightening, oil all of the stand bearings. Wipe off the excess oil.
5. If the stand has casters, place two or three drops of oil on the caster bearing pins.

### Reassembling the machine

Replace all parts that have been removed from the machine. To replace a shuttle of the type shown in figure 34, turn the hand wheel until the needle is on its way down and the arrow *A* in the shuttle race is approaching the top. Turn the shuttle to the position shown. Place the small holes *B* in the shuttle over the pins *C* in the race and ease into place.

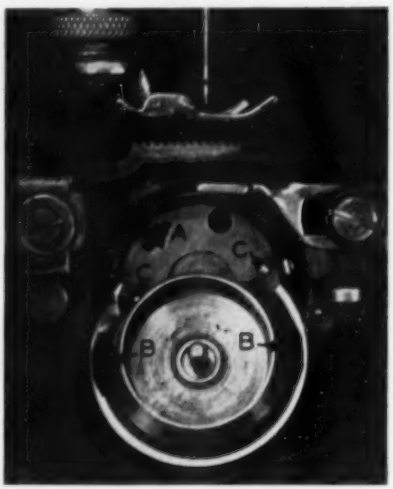



***Figure 34.*** **Position of shuttle in one make of machine for correct replacement**
A, arrow in shuttle race; B, small holes in shuttle; C, pins in shuttle race

The finish on machines painted black sometimes turns a grayish color after using cleaning fluid on it. To restore the original black color, polish the head with a soft cloth moistened with machine oil. Caution: If by chance any cleaning fluid has gotten into the motor or into the wiring, do not run the motor until the fluid has evaporated.

## Threading the Machine

SELECT thread of correct size for your material. Your instruction book lists sizes for various materials and indicates the procedure for threading.

Use a needle of the right size for the thread selected. Refer to your instruction book. A needle that is too coarse pokes holes in the cloth too large for the thread to fill. A needle too fine for the thread may cause the stitch to skip or the upper thread to break.

Use the same size thread on the bobbin as on top of the machine, except for special stitching effects.

On all machines, the upper thread runs from the *spool* to the *upper tension,* to the *thread take-up,* and then to the *needle.* Various guides hold the thread in the correct position as it feeds to these main points: tension, take-up, and needle. See figures 4A, 13 and 41. Pass the thread through the needle from the side with the long groove to the side with the short groove. Place the bobbin in its case or shuttle. Pull the thread under the lower or bobbin tension, according to the instruction book or according to directions in figure 35. If the shuttle is not threaded correctly, the thread may catch and break, or loops may form in the stitching along the top of the cloth. A bobbin put in the bobbin case incorrectly may unthread.

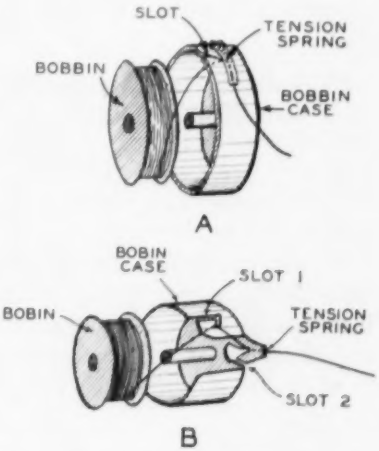



***Figure 35.*** **Threading the bobbin case**

Hold the bobbin so that the thread comes off at the bottom as shown at A and B. If the thread comes off over the top, it may come out of the slot in the bobbin case while sewing and cause the bobbin to unthread.

At *A*, slip the bobbin into the bobbin case, pull the thread into the slot, and then under the tension spring, leaving 3 or 4 inches of thread extending beyond the end of the tension spring.

At *B*, slip the bobbin in the case, pull the thread first through *slot 1* then through *slot 2* and finally under the tension spring. Leave 3 or 4 inches of thread beyond the spring.

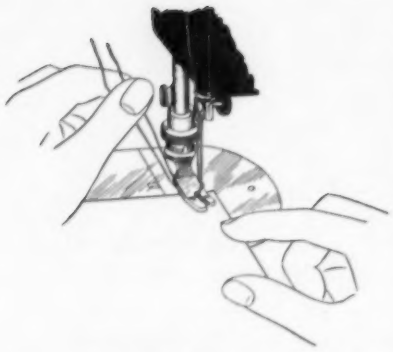


*Figure 36.* **Both threads pulled back when ready to begin the stitch**

After threading the needle and placing the threaded bobbin in position in the shuttle, hold the end of the upper thread and run the needle down and back once to bring the lower thread above the needle plate. Pull both threads back of the presser foot with the upper thread through the slot of the presser foot as shown in figure 36.

## Winding the Bobbin

USE the same size thread on the bobbin as on top of the machine, except for special stitching effects.

If the machine has no automatic bobbin-winder release, be careful not to wind the bobbin too full. Also, be careful not to wind it too tight. Either may cause the lower thread to break. Never wind thread on a partly filled bobbin.

If the bobbin winder fails to operate correctly, adjust it as directed on pages 49 and 50.

After threading the machine, stitch a piece of scrap cloth to check the operation and to soak up any excess oil which might be left on the machine. If the machine fails to make a satisfactory stitch, one or more adjustments may be needed. Check the adjustments in the order suggested on pages 38 to 49.

## Adjusting the Machine

### Adjustments to eliminate noise

Noise in operation is due mostly to loose bearings, or, in long-shuttle machines, to too much play between the shuttle carrier and the shuttle. The shuttle should be just loose enough in the carrier to allow the thread to pass around the shuttle without breaking the thread. The arms of the carrier can be bent for the correct adjustment. Do not attempt this adjustment unless you are sure you know how.

Many of the bearings, particularly those underneath the head, are adjustable in the same manner as described for treadle bearings on page 35. Bearings with bushings cannot be adjusted, but a badly worn bushing must be replaced to eliminate the noise. This is a job for a skilled repairman.

## Adjusting the needle

Sewing-machine needles come in many styles, differing as to length and shape of shank as well as in size. Each style of a given brand has its own number (table 1, page 40).

If your machine skips stitches, breaks the upper thread, or makes side puckers in the goods, the first place to look for trouble is the needle.

The needle should be sharp, straight, and of the correct length. It must be set in the needle-holding clamp so the short groove side of the needle faces the shuttle point or hook as it passes the needle. In all but the oldest machines, the needle sets up against the stop pin in the needle bar.

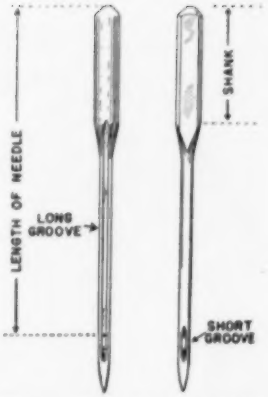



*Figure 37.* **Parts of a needle**

To make sure a needle is the correct length, turn the hand wheel slowly and at the same time watch the point or the hook of the shuttle as it passes the needle. The point or hook of the shuttle should pass the needle about 1/16 inch above the eye of the needle so the shuttle point enters the loop of the upper thread at its broadest point (figure 38). If the hook misses the loop or barely catches it while turning by hand, the machine skips stitches when sewing. Either the needle is the wrong length or, on some machines with adjustable needle-bar, the needle-bar may be set too low or too high. First make sure that you have the correct needle for your machine (table 1). Most of the new machines use 15 x 1 Singer needle or the equivalent. If the needle-bar is adjustable, set it so that the hook passes the needle approximately 1/16 inch above the eye of the needle.

Side puckers are due to a dull or blunt needle that pulls the threads in the material while stitching. This is the only cause of side puckers.

If necessary, a blunt needle or one with a small hook on the point can be sharpened on a fine emery stone. Hold the needle between the thumb and middle finger, roll it and at the same time draw it lengthwise over

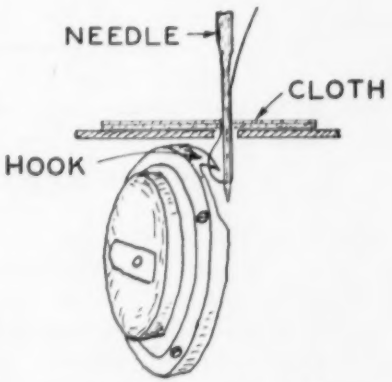



*Figure 38.* **Position of needle**

The needle should be of such a length that the point of the shuttle or shuttle hook will pass through the center of the loop in the upper thread.

TABLE 1. INTERCHANGEABLE NEEDLE LIST*

| Names of sewing machines† | Brewer Sewing Supplies Co. | Boye Needle Co. | Bryson's Universal Code | Crowley | National Sewing Machine Co. | Singer | The Torrington Co. (key letter) | Sewing Supply Co. | Needles (actual length) |
|---|---|---|---|---|---|---|---|---|---|
| Damascus | M | 6 | Y | 62 | D | 15×1 | BB | 14 | |
| Domestic | J | 16 | Y | 62 | D | 15×1 | Y | 18 | |
| Eldredge, 2 Spool | R | 16 | Y | 62 | D | 15×1 | CC | 18 | |
| Franklin | R | 16 | Y | 62 | D | 15×1 | CC | 18 | |
| Free | J | 16 | Y | 62 | D | 15×1 | Y | 11 | |
| Kenmore | R | 16 | Y | 62 | D | 15×1 | CC | 14 | |
| Minnesota H | M | 6 | Y | 62 | D | 15×1 | BB | 14 | |
| New Home, Rotary | J | 16 | Y | 62 | D | 15×1 | Y | 11 | |
| New Royal A | J | 16 | Y | 62 | D | 15×1 | Y | 11 | |
| Singer, 27, 127, 15, 66, 101, 115, 201 | M | 6 | Y | 62 | D | 15×1 | BB | 11 | |
| Standard, Rotary | M | 6 | Y | 62 | D | 15×1 | BB | 14 | |
| White, Rotary | R | 16 | Y | 62 | D | 15×1 | LL | 18 | |
| Brunswick | E | 14 | Z | 56 | C | 20×1 | J | 4 | |
| Damascus | E | 14 | Z | 56 | C | 20×1 | J | 4 | |
| Eldredge, Rotary | E | 14 | Z | 56 | C | 20×1 | J | 4 | |
| Minnesota I | G | 4 | Z | 60 | C | 20×1 | R | 8 | |
| National, Rotary | E | 14 | Z | 56 | C | 20×1 | J | 4 | |
| New Home, Vibrator | G | 4 | Z | 60 | C | 20×1 | R | 8 | |
| New Royal | I | 24 | Z | 74 | C | 20×1 | T | 12 | |
| The Franklin | P | 12 | Z | 66 | C | 20×1 | KK | 4 | |
| Western Electric | E | 14 | Z | 56 | C | 20×1 | J | 4 | |
| Westinghouse | E | 14 | Z | 56 | C | 20×1 | J | 4 | |
| White, Vibrator | P | 12 | Z | 66 | C | 20×1 | KK | 17 | |
| New Domestic | D | 8 | 1& | 52 | A | 1×4 | H | 3 | |
| Household | H | 2 | &2 | 58 | F | 1×7 | M | 9 | |
| Singer, 9W1, 9W2, 9W7<br>Wheeler & Wilson, 6, 7, 8, 9 | O | 18 | X2 | 68 | E | 9N1 | HH | 16 | |
| Davis, New Style—Long | C | 10 | X1 | 54 | B | 1×2 | F | 2 | |
| White, Old Style | T | 20 | &4 | 70 | .. | 1×1 | N | 6 | |

* Material from the Bryson's Interchangeable Needle List. Used by permission of the White Sewing Machine Company.
† Necchi, Pfaff, Elna, Sheraton, Bellaire, and most foreign-made machines use Singer 15×1 or equivalent needles.

the emery stone. Guide the needle with the forefinger as shown in figure 39. It is best, however, to replace a blunt needle with a new one.

You should always replace a bent needle, because a bent needle may strike the edge of the hole in the throat plate or strike the edge of the shuttle. This either breaks or blunts the needle, and may also roughen the edge of the hole in the needle plate and cause the upper thread to break.

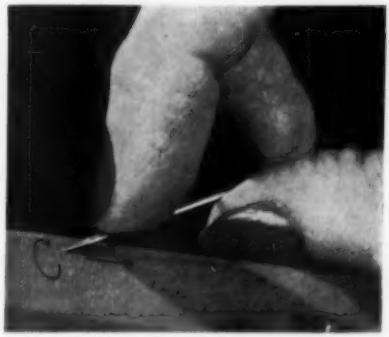


*Figure 39.* **Sharpening a needle**

To determine whether a needle is slightly bent, make the following test: With the needle set correctly in the machine, turn the hand wheel slowly and at the same time watch the needle closely as it goes down through the hole in the needle plate. The entire stroke of the needle should go through the needle hole in exactly the same position in which the point entered it. If in doubt as to whether a needle is crooked, replace it with a new one.

If a straight needle, correctly set, hits the edge of the needle hole, the position of the needle bar needs to be adjusted if possible. On machines that have a removable needle-bar housing, you can adjust the needle bar by loosening the screws that hold the front of the needle-bar housing and moving the housing until the needle does enter the center of the hole (figure 5). Hold the housing firmly in place as you retighten the screws.

On machines with a face plate (figure 4) or with a needle-bar housing that separates at the needle bar (figure 6), this adjustment can be made.

### Adjusting the thread-take-up spring

Thread-take-up springs for old and new machines are shown in figures 40 and 41. A spring too tight or too late in coming to rest against the stop pin prevents the loop for the shuttle hook from forming and the machine will skip stitches. If the spring loop is broken, bent, or missing, replace it with a new one. Two types of adjustments may be needed on the take-up spring: (1) the loop of the spring should release the thread just before the eye of the needle enters the goods, and (2) the spring should be just tight enough to keep the thread taut:

1. Stitch an inch or two on a piece of test material, then turn the hand wheel slowly and watch the action of the thread-take-up spring as the

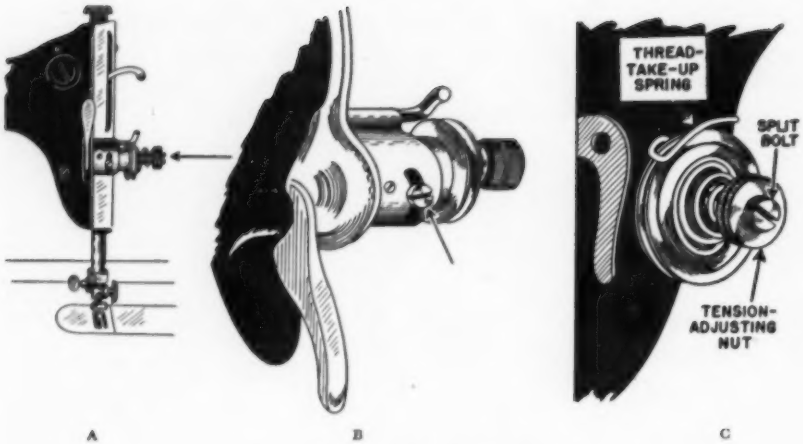



***Figure 40.*** **Upper-thread tensions**

*A* shows split bolt at point of arrow; *B* shows adjusting screw at point of arrow; *C* shows take-up spring, split bolt, and adjusting nut.

needle enters the cloth. The spring should release its tension on the thread just as the eye of the needle is about to enter the cloth. If the spring comes to rest too soon, or after the needle-eye enters the cloth, adjust the spring according to the directions in your instruction book. For some of the older machines which may not have instruction books, proceed as follows:

Loosen the screw (at arrow in figure 40B) that fastens the take-up spring holder.

Rotate the holder until the correct adjustment is made, then tighten the screw.

On some of the older machines, the take-up spring is held in position by the split stud which extends through the tension device (figure 40C). To adjust the spring on such machines, remove the tension-adjusting nut, the tension-adjusting spring, and the tension discs. Then replace the tension-adjusting nut on the split bolt to about the depth of the nut and unscrew the bolt with a screwdriver. Replacing the nut on the end of the bolt prevents the screwdriver from spreading the end of the bolt.

When you have loosened the bolt, rotate the spring until its loop is straight down. Tighten the split bolt, and test the take-up spring to see whether it now has the right amount of tension to draw the slack from the thread and always to return to its stop. If it is not yet correct, again loosen the split bolt

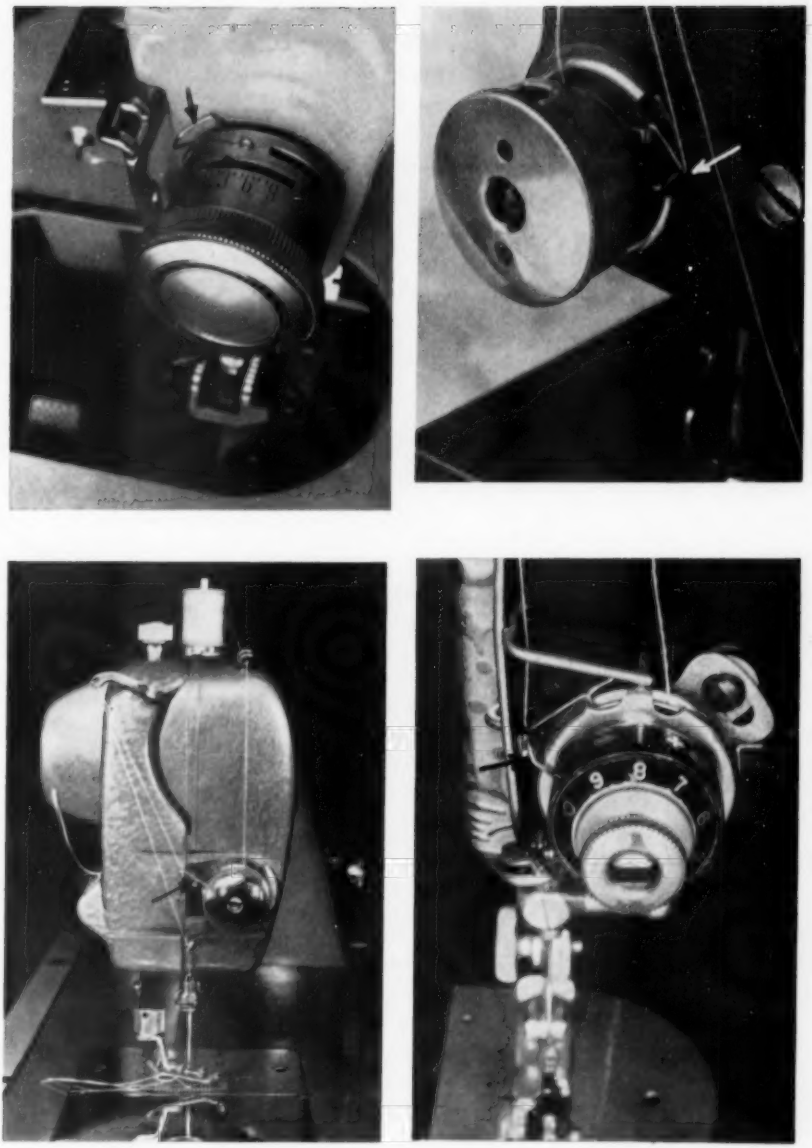



*Figure 41.* **Upper-tension devices on some of the newer machines**
Arrows indicate thread-take-up springs

and rotate the spring to increase or decrease the tension as needed. Repeat this operation until the spring is adjusted to function properly. Then reassemble the parts of the tension that have been removed.

If your machine is one in which the take-up spring is not held as described, and you have no instruction book, you can probably determine how to increase or decrease the tension by examining it carefully. If you have never adjusted a take-up spring, it would be wise *to get expert help to learn how to do it.*

### Adjusting the feed dog

How well the feed dog works depends upon its setting and the amount of pressure on the presser foot. Seldom does it need to be replaced.

The feed dog is correctly set when the *bottoms* of the notches of the teeth are approximately flush with the top surface of the needle plate and the dog is at the highest position (figure 42). A feed dog set too high makes it difficult to guide material through the machine; if set too low, it will not feed the goods through.

Most of the older machines and a few of the new machines have an adjustable feed dog. Many of the new machines either have no adjustment or the feed dog can be raised or lowered only by means of shims. Some machines built for fancy sewing, such as zig-zag stitching and darning, have a special feed-dog release as shown at C in figures 24, 27, and 29. These re-

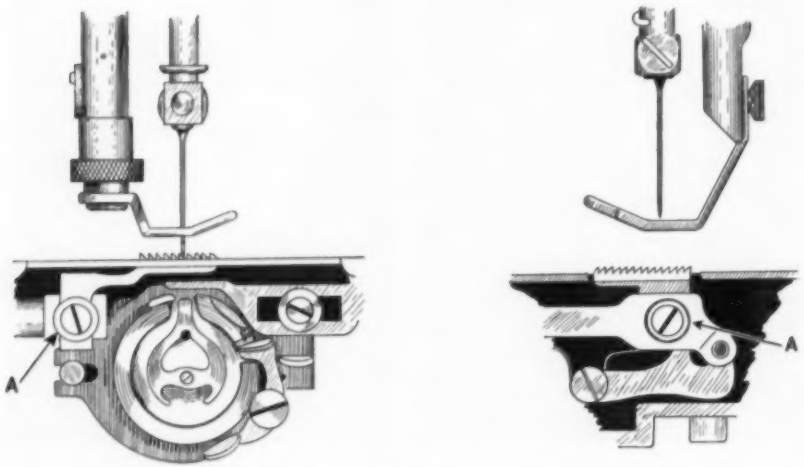



***Figure 42.*** **How to raise or lower the feed dog**

To raise or lower the feed dog, loosen screw *A*. Put feed dog at correct height, then tighten screw.

lease mechanisms allow the feed dog to drop down below the needle plate so that it is inoperative for special work. If this release mechanism is not set to full return position, the feed dog may be too low. Check this on such machines before you attempt to make adjustments.

If the feed dog is adjustable as in figure 42, loosen the screw *A* that holds the feed dog in place, move the dog up or down to the correct position, and tighten the screw. This screw is on the left or right side of the feed-dog carrier, depending on the make of machine.

### Adjusting the presser foot

It is the function of the presser foot to press the cloth down against the feed dog so that the feed-dog teeth engage the cloth to advance it for the length of stitch. The pressure should be such that the cloth feeds through, yet allows the cloth to swing in any direction or make a complete circle while stitching without raising the presser foot.

When sewing across a plain seam, the cloth should go through under the presser foot without your help. If the seam does not go through, loosen the pressure-control screw at the top of the bar. *Do not pull on the goods by hand.* To do so may break or damage the needle. For a heavy or thick seam, raise the presser-foot bar slightly by the lifting lever until the seam passes under the presser foot.

On some of the newer machines built for special sewing, there is a special presser-foot release at the top of the bar (figure 26 at A and B). This release enables the operator to remove quickly all pressure from the presser foot for special sewing without disturbing the adjustment on the spring.

### Adjusting the shuttle and shuttle carrier

Rough or sharp edges on the shuttle, the shuttle carrier, or the shuttle spring may catch, break, or damage the thread. Smooth these rough edges with a fine emery stone or whetstone.

Check the adjustment of the shuttle carrier on a long-shuttle machine to see whether the thread passes freely between the shuttle and its carrier. If the thread does not pass freely, correct the condition by loosening the screw that holds the carrier, moving the carrier slightly away from the race, and

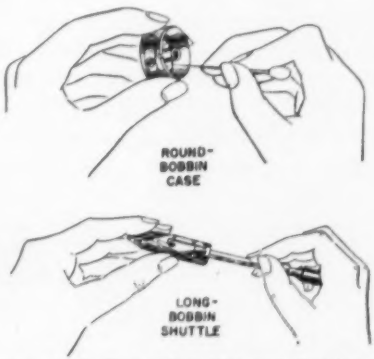



*Figure 43.* **Removing dirt and lint from inside of shuttle with a pin or screwdriver**

then tightening the screw firmly. You should have the help of an experienced person for this adjustment.

Make sure that lint and dust have not collected in the bobbin case of a round-bobbin machine or in the shuttle of the long-bobbin machine (figure 43). Lint often collects back of the bobbin and prevents it from turning freely. This has the same effect as a lower tension that is too tight.

Also, make sure that no lint or strippings from the thread have collected under the lower-tension spring. Such material jammed under this spring makes it impossible to adjust the lower tension correctly. Lint can usually be removed with a pin or needle as shown in figure 44. If this method is not successful, loosen or remove the lower-tension adjusting screw and clean under the spring with a brush. This makes it necessary to readjust the lower tension when you replace the spring and its adjusting screw (page 47).

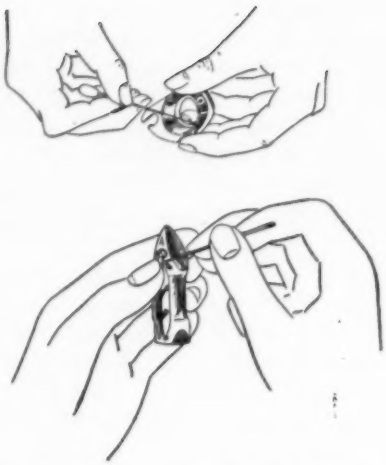


***Figure 44.*** **Removing dirt and lint from under the lower-tension spring**

## Adjusting tensions

The instruction book for your machine tells you how to loosen or tighten the tensions. Upper tensions are illustrated in figures 4, 24 through 30, 40, and 41. Lower tension devices are on the bobbin holder. These also vary in design according to the make of the machine. Several common types of lower tensions are illustrated in figure 45.

Space will not permit a detailed description of each type of tension device. The following general instructions, however, apply to all types:

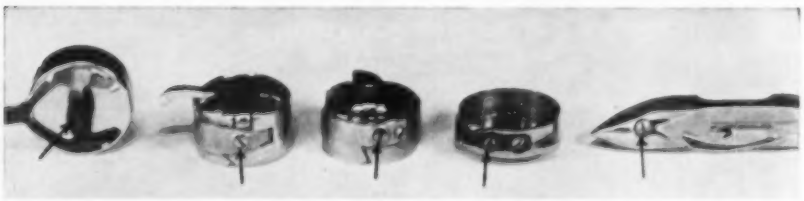


***Figure 45.*** **Types of bobbin cases showing variations in lower-tension devices The arrows point to the screws for adjusting the tension.**

1. Be sure that the same type and size of thread is used in the bobbin as on top of the machine.
2. If for any reason either or both tensions have been taken apart or otherwise disturbed, set them by guess. The lower tension should be set just tight enough to require between a 1- and a 2-ounce pull to draw the thread through. (Refer to figure 45 to adjust the tension.) The upper tension should be set just a little tighter than the lower.

   Before proceeding further, it is well to learn the following general rule: Set the lower (bobbin) tension by guess, then consider it correct until you have proved it wrong. To do this, make adjustments with the upper tension as follows: If the upper thread tension is tighter than the lower, loosen it; if the lower tension (bobbin) is tighter than the upper tension, tighten the upper tension.
3. To adjust sewing-machine tensions for average sewing, use a piece of unbleached muslin about 6 inches wide and from 6 to 8 inches long. Fold it the long way, making a double piece of cloth about 3 inches wide. For specific work, use a piece of the goods to be stitched.
4. Stitch diagonally across the piece at an angle of about 45 degrees (figure 46).
5. Inspect the stitch to determine the kind of stitch the machine is making. If the cloth is puckered along the seam, one or both tensions are too tight.

Loops on the underside of the seam indicate that the upper tension is too loose, the machine is threaded wrong (page 37) or the upper

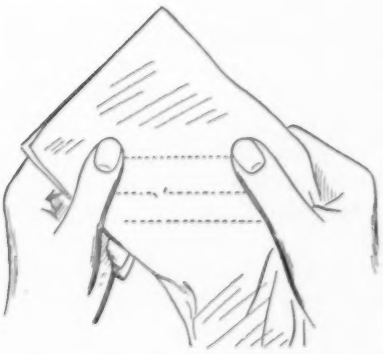


***Figure 46.*** **Testing the stitch to determine whether tensions are balanced**

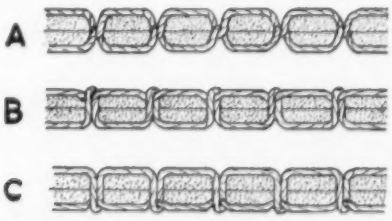



***Figure 47.*** **Stitch in relation to tension**

A. A perfect stitch, tension balanced. Both threads will break when pulled as in figure 46.

B. Threads lock on the upper surface of the material. Upper tension tighter than lower tension. Upper thread will break when pulled.

C. Threads lock on the under surface of the material. Upper tension looser than lower tension. Lower thread will break when pulled.

thread is catching on some part of the machine, usually the shuttle or between the shuttle and its carrier.

If the upper thread lays on top of the goods in nearly a straight line as shown in figure 47B, the upper tension is *tighter* than the lower one. Loosen the upper tension, then try the stitch.

The lower tension is always assumed to be correct until it is found to be too tight or too loose; therefore, adjust the *upper* tension until a balanced stitch is obtained.

If the bottom thread lays on the bottom of the goods in a straight line as shown in figure 47C, the upper tension is looser than the lower tension. Tighten the upper tension.

6. At this point the stitch may look about the same on both sides of the material. Yet if it does not lock in the center of the two or more thicknesses of material, it is an unbalanced stitch. One thread is shorter than the other and, upon strain the shorter one breaks, especially when the stitching is on the bias. A balanced stitch is strong because the threads are equal in length and it requires enough strain to break both threads before the stitch gives way.

   *To test further the condition of the stitch,* take the ends of the stitching between the thumb and first finger of each hand and pull it until one or both threads break as shown in figure 46 (page 47). If it is impossible to break either thread of the bias stitching, both tensions are probably too loose. (Use this adjustment when sewing goods on a bias, so that when the goods is stretched the threads will not break.) Then both should be tightened. If the cloth puckers along the stitch, then both tensions are too tight. Loosen the lower tension and adjust the upper tension to it. Here is where you have proved that the lower, or shuttle, tension is wrong.

   If the upper thread alone breaks, the upper tension is tighter than the lower tension (figure 47B).

   If the lower thread alone breaks, the upper tension is looser than the lower tension (figure 47C).

   If both threads break, the tensions are equal (figure 47A) and, unless the cloth puckers, the tensions are now correctly adjusted. If you want a tighter or a looser stitch, tighten or loosen both tensions accordingly. Then retest the stitch as directed above.

7. Make the necessary adjustments to correct the stitch as follows: Usually, as already mentioned, the upper tension is the only one that needs adjusting, therefore, always adjust the upper tension first.

   If by pulling the stitching as directed, the lower thread alone breaks, tighten the upper tension by about ¼ turn to the right. Then make another diagonal seam and stretch it as before. If the lower thread

again breaks, tighten the upper tension some more and repeat this operation until both threads break or the upper thread alone breaks. If the upper thread alone breaks, as shown in figure 46, the upper tension has been tightened too much. Loosen it by slight turns to the left until both threads break upon stretching the bias seam. If the seam puckers before a perfect stitch is obtained, the lower tension is too tight and should be loosened and the stitch retested.

8. If by pulling the stitching as directed, the upper thread alone breaks, as shown in figure 46, loosen the upper tension about ¼ turn. Then make another diagonal seam and stretch it as before. If the upper thread again breaks, loosen the upper tension some more and repeat this operation until both threads break or the lower thread alone breaks. If the lower thread alone breaks, the upper tension has been loosened too much. Tighten it by slight turns until both threads break on stretching the bias seam. If the stitches are loose in the cloth before a perfect stitch is made, the lower tension is too loose and should now be tightened and the stitch retested. Continue until the machine makes a balanced stitch.

## Adjusting the bobbin winder

Bobbin winders may need adjustment (1) to bring them closer to the hand wheel or to the belt so that they will be more positively driven, or (2) on some machines the thread distributing arm may need bending to make the thread wind level on the bobbin. Adjustments on one type of older machine, are shown in figures 48 to 50. The procedure is as follows:

**To adjust winder close to hand wheel or belt**

1. Loosen the adjustment screw A in figure 48.

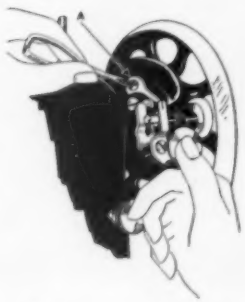



***Figure 48.*** **Adjusting bobbin winder**

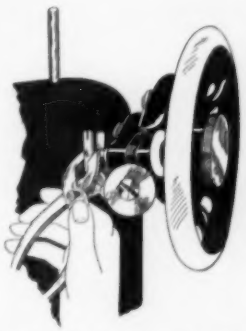


***Figure 49.*** **Adjusting bobbin-winder distributing arm on round-bobbin machine**

2. Press the winder lightly against the hub of the hand wheel.
3. Tighten screw A.

Never get oil on the rubber ring of the bobbin winder. Oil or grease makes the ring slip and will destroy the rubber. If the ring slips, put chalk or face powder on it to absorb the oil or grease. If the ring has lost its "stretch," replace it with a new one.

**To adjust bobbin-winder distributing arm**

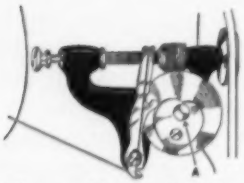



***Figure 50.*** **A bobbin-winder distributing arm on long-bobbin machine**

If the thread piles up at one end of the bobbin (round bobbin, figure 49; long bobbin, figure 50), adjust the arm that guides the thread as you wind the bobbin. Most thread-guide arms have a narrow place near the center where they bend rather easily. With pliers, grip the arm above this point and bend it away from the end of the bobbin at which the thread heaps up. If your machine has no thread distributing arm, distribute the thread by hand.

## Adjusting the clutch

On all machines there is a clutch on the right-hand side of the hand-wheel. The clutch disconnects the driving mechanism from the sewing mechanism when you want to wind a bobbin.

### Kinds of clutches

The two kinds of clutches commonly found on family sewing machines are:

***Figure 51.*** **A friction-disk clutch**

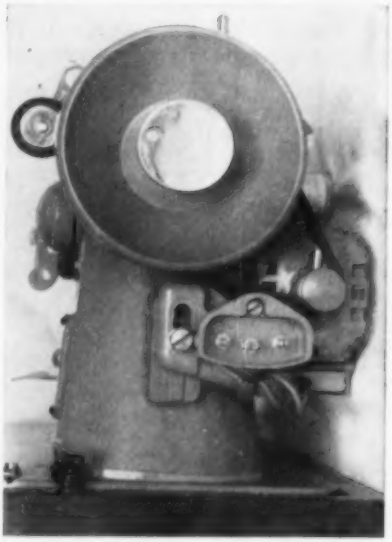


***Figure 52.*** **Right-hand end of modern sewing-machine head showing one type of friction clutch and motor mount**

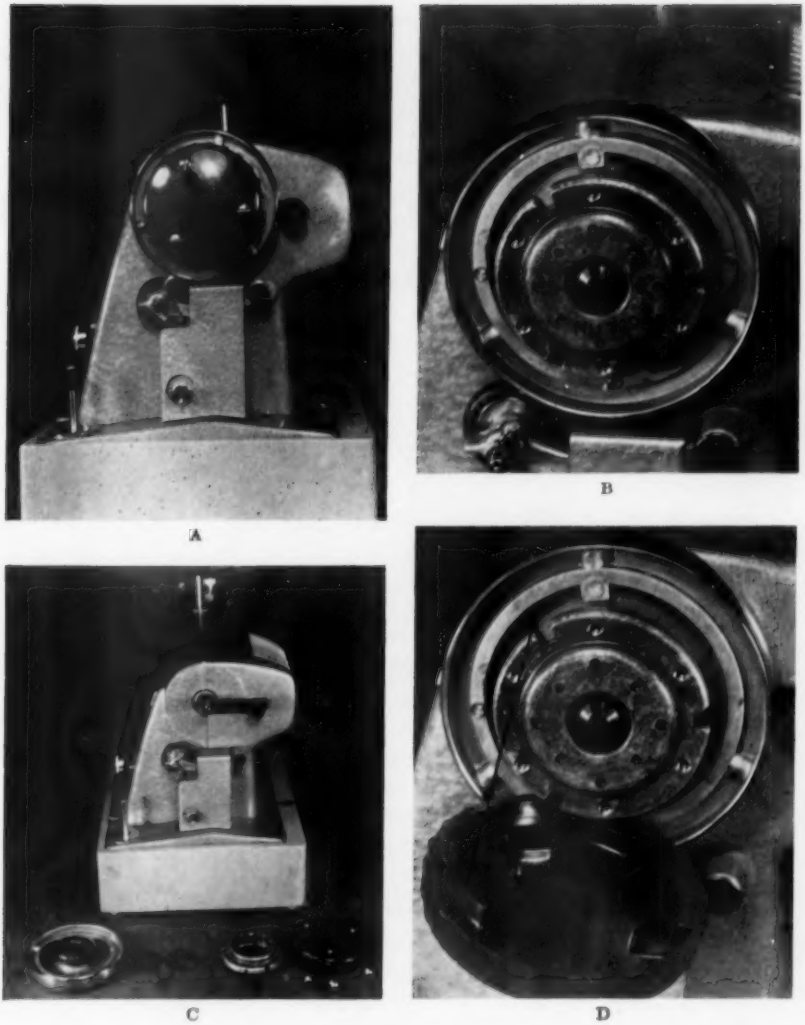
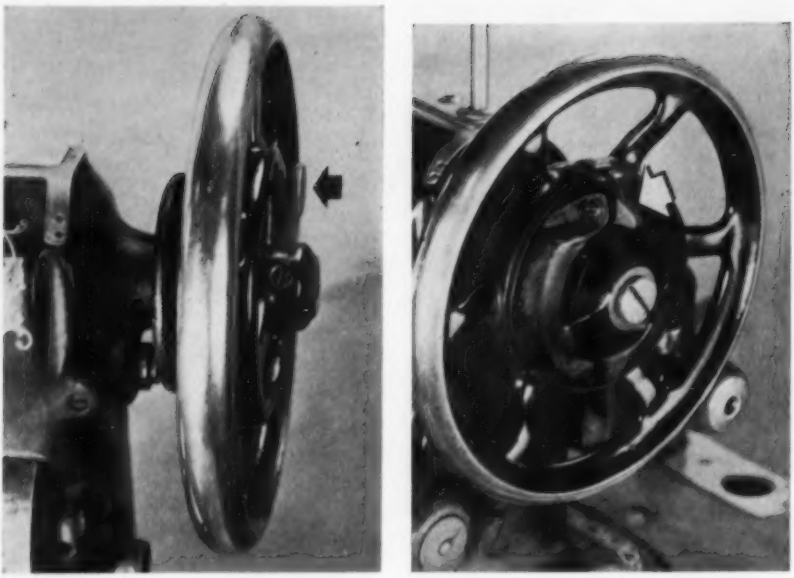



***Figure 53.*** **Friction clutch on a 1953 machine**

*To clean the clutch:*

1. Remove the plastic knob by removing the three screws indicated by arrows in *A*.
2. Remove the large nut shown in B. Turn the nut counter clockwise to screw it off.
3. Remove the key, friction discs, and hand wheel in that order and as shown, right to left, at 3, 4, and 5 in C.
4. Clean the shaft and bearing until the handwheel will spin freely on the shaft.
5. Reassemble the clutch. The plastic knob should be positioned as indicated by arrow in D.



A B

***Figure 54.*** **Two types of jaw clutch**

The hand wheel or a flange is attached rigidly to the end of the arm shaft. The clutch in *A* is released or engaged by a thumbscrew, that in *B* by a lever.

*A friction disc type* of clutch in which the hand-wheel may rotate freely on a sleeve on the end of the arm shaft and which is actuated by a lock nut or thumb nut (figures 51, 52, and 53).

*A jaw type of clutch* in which the hand-wheel or a flange is attached rigidly to the end of the arm shaft. This type of clutch is actuated by a thumbscrew (figure 54A) or by a lever (figure 54B) or by a lock bolt.

Some clutch nuts have left-handed threads. Such nuts have arrows stamped on them to indicate the direction to turn them.

**Should release**

Occasionally when the clutch is released, the sewing mechanism continues to run while winding a bobbin because some oil has dried in the bearings or some threads have become wound within them, or both. Check the clutch at this time to see whether it releases. If not, it should be taken apart, cleaned, and adjusted.

If the clutch cannot be released so the sewing mechanism will not oper-

ate while winding a bobbin, first remove any threads or lint from the hand-wheel bearings. Then with the clutch in the release position, with your left hand hold the needle bar from operating and run the driving mechanism for several minutes. If this does not loosen the clutch enough so the machine remains quiet while winding a bobbin, squirt a few drops of cleaning fluid or kerosene into the bearings and run the driving mechanism for several minutes with the clutch disengaged, adding cleaning fluid at about one-minute intervals. If the machine is motor-driven, do not let the cleaning fluid get into the motor.

If the clutch still fails to disconnect the mechanism, probably the surfaces of the hand-wheel bearings are rough and coated with varnish (dried oil). Remove the clutch and thoroughly clean it as follows:

**Friction type of clutch**

Friction clutches vary somewhat on different makes of machines. Any variations from those illustrated here are rare and servicing procedures may have to be obtained from the instruction book, a dealer, or the manufacturer,

For the type of clutch shown in figures 51 and 52, loosen the screw indicated at A in figure 51 in the clutch-locking nut. Unscrew the lock-nut, remove the clutch washer and take off the hand-wheel.

For the clutch shown in figure 53, proceed as directed in the title of the illustration.

In any case, after removing the hand-wheel, clean the hand-wheel bearings with cleaning fluid. When dry, smooth the shaft with *fine* sandpaper (00 or 000). Wash thoroughly with cleaning fluid and replace the hand-wheel. It should spin freely; if it does not, continue to use the sandpaper until it does.

For the clutch of figures 51 and 52, replace the clutch washer with the inner lugs in the square notches and slanting outward. Then replace the lock nut, and tighten screw *A*. Now turn the lock nut backwards until the end of screw *A* bumps one of the three outer lugs on the clutch washer and see whether the hand-wheel runs freely without running the machine. If not, again remove the lock nut, remove the adjusting washer carefully, and rotate the washer one-half turn. Replace the parts and tighten screw *A*. Again check to be sure that the hand-wheel turns freely when the lock nut is loosened. If the clutch cannot be tightened, then turn the washer over and repeat the steps. Do not oil the clutch.

For the clutch of figure 53, reassemble in the reverse order of taking apart. There are several positions for the plastic knob. To set it in the correct position for replacement, run the nut up tight, then place the plastic knob over the nut with the lug in the position indicated at *D* in figure 53.

Replace the three screws. After replacement, loosen the clutch by turning the knob as far to the left as it will go and then run the machine to see whether the clutch releases.

**Jaw type of clutch**

The jaw type of clutch is engaged or disengaged by a thumbscrew (figure 54A) or by a locking lever (figure 54B) which fits into a notch. When this type of clutch does not disengage the sewing mechanism, probably threads are wound in the small bandwheel bearing or lint and dried oil are in the bearings, or both. To free this bearing, first remove any threads from the bearing. Then operate the treadle or the motor and at the same time hold the machine from running and squirt some cleaning fluid or kerosene into the bearing as already described on page 26.

If the clutch still does not run freely, loosen the screw in the center of the hand wheel and, with a screwdriver in the slot, tap the screwdriver with a light hammer. Set the screw fairly tight. If this procedure fails to correct the trouble, then remove the clutch. This requires special tools and *should be attempted only by one familiar with the operation.*

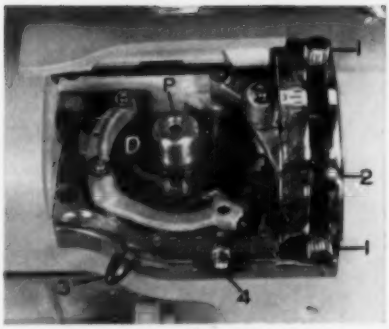
### Adjusting the belt

To shorten a leather drive belt that is too loose, open the hook that holds the belt ends together, pull the belt tight, measure carefully how much of the belt should be cut off, and then cut. Punch a new hole in the belt. All leather belts have one smooth strip. Lay the belt on a piece of wood and punch the hole with a stiletto or an icepick down through this smooth strip straight to the other side of the belt. This makes a hole that will not pull out. Be careful not to tear the leather at the hole. Hook the two ends together and flatten the hook with pliers.

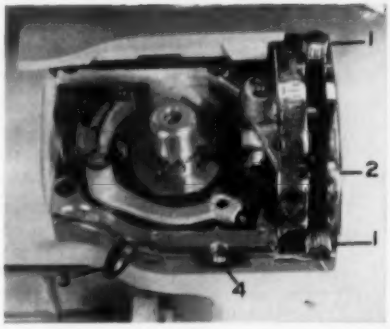
If the machine has an endless or "V" belt, tighten it by moving the motor. If the belt is stretched too much for this adjustment, install a new belt.

## Special Features of New Machines

MANY of the newer machines (figures 24 through 30) have a reversing mechanism for sewing backward. Some manufacturers have models (figures 25, 29, and 30) that do additional special and fancy sewing without attachments. Each machine in figures 25 and 30 has sets of special cams which, when placed on the machine, automatically cause the machine to sew some special stitch (figure 55). The type of stitch produced by each cam is printed on the cam for ease of selection (figure 55A). The machine of figure 29 has selection levers with which the operator can make the machine do special sewing without cams.




A




B

***Figure 55.*** **The stitch-control mechanism on one make of machine for automatic control of special types of sewing**

*A. The cam D in place.*

The type of stitch produced by the cam is printed on the cam as shown. The cam can be removed for replacement with another merely by pressing down on the pushbutton *P* at the center and lifting the cam out.

*B. The mechanism with cam removed.*

1. Stitch-length stops
2. Stitch-length regulator
3. Stitch-width regulator
4. Stitch-centering wheel

These features are useful for one who does considerable special and fancy stitching. If, however, you do only a limited amount of plain stitching, the extra cost of the special features may not be justified.

The instruction book for each type of these machines gives details of operation of the special features, together with the care and adjustments. The routine care consists essentially of cleaning and oiling as for other types of machines.

In the machine shown in figure 30, the bobbin and other lower working parts are in a narrow arm supported above the base which permits sewing around sleeves or other small dimensioned articles. This feature is also convenient for darning socks and other small garments. The machine carrying case fits around the arm to make a sewing table when desired.

## Running the Machine

The following are general suggestions for running any machine:

1. Select thread of correct size for your material. Your instruction book lists sizes for various materials.

2. Use a needle of the right size for the thread selected. Refer to your instruction book. A needle that is too coarse pokes holes in the cloth too large for the thread to fill. A needle too fine for the thread may cause the stitch to skip or the upper thread to break.

3. Use the same type and size of thread on the bobbin as on top of the machine, except for special stitching effects. Changing the type or size of thread in one place and not in the other is likely to affect the tension adjustment.

4. If the machine has no automatic bobbin-winder release, be careful not to wind the bobbin too full. Also, be careful not to wind it too tight. Either may cause the lower thread to break. Never wind thread on a partly filled bobbin.

5. Set the stitch length. Light-weight fabrics need a short stitch, and heavy fabrics a longer stitch. If necessary, adjust the upper tension to suit the thread and the material. For ordinary sewing on a lock-stitch machine, from 12 to 16 stitches to an inch are about right.

6. When beginning to stitch, be sure that both threads extend back under the presser foot as shown in figure 36. Otherwise, a bunch of loops may form on the underside of the goods at the beginning of the stitching. This is particularly true with round-bobbin machines.

7. Place the material under the presser foot so that the needle will go through the cloth, then lower the presser foot. Do not run the machine without a cloth under the presser foot.

8. Do not pull the goods through the machine, because you are likely to pull the needle out of line enough so it hits the edge of the hole in the needle plate. This may break the needle or it may bend or dull the needle or both. A bent needle may cause the stitches to skip. A dull needle may cause side puckers. If the cloth does not feed through without pulling on it, check first to see that the stitch length adjustment is not set on zero; then check the presser foot tension and the height of the feed dog.

   If, after the above procedures, the machine fails to sew correctly, consult the following pages on sewing-machine troubles:

9. When the end of a line of stitching is reached, stop the machine. Bring the take-up level to its highest point and raise the presser foot. Pull the goods carefully, either sidewise or backwards, to be sure the upper thread stays in the notch of the presser foot. A forward pull on the thread might break the thread. Cut the thread, leaving enough to prevent the needle from unthreading and then remove the material.

## Summary of Sewing-Machine Troubles—Cause and Remedy

THE following outline is intended as a guide to help you find the cause of some of the more common troubles and to make the necessary adjustments or replacements. How to make most of the adjustments and the names and locations of parts usually are given in the instruction book.

To use the outline, refer to the specific trouble indicated in bold face (heavy) type. The trouble may be due to one or a combination of several causes. Begin with the first cause listed. Examine the part of the machine directly concerned. Either an adjustment or a replacement may be needed. Try the machine.

Take each of the other causes in the order listed and treat them as described until the machine runs satisfactorily.

### Machine runs hard

**1. Lack of oil**

Locate all bearings, clean and oil each one. Refer to your instruction book. A bearing is a place where one part rubs against or turns within another. Not all bearings have oil holes. Refer to pages 15 to 21 and 26 to 35.

**2. Thread in the band wheel or other bearings**

Remove the thread with a pin or some other pointed instrument.

**3. Gummed oil or dirt in bearing**

Refer to instructions for cleaning machines (page 22).

**4. Tight bearing**

Bearings are seldom tight unless adjustments have been made or parts have been removed and replaced.

Loosen slightly any tight bearings which are adjustable.

**5. Belt too tight**

If either the motor-drive or treadle-drive belt is too tight, loosen it. On motor-driven machines, the belt can be loosened by adjusting the motor closer to the hand wheel. On treadle-driven machines, use a new and longer belt.

**6. Friction drive too tight.**

(A friction drive is one where a rubber disc on the motor shaft rubs against the hand wheel. If this disc is too tight against the hand wheel, it overloads the motor.)

Loosen the drive.

### Machine makes an imperfect stitch

An imperfect stitch is one in which the threads do not lock in the center of the goods, sometimes called an *unbalanced stitch*. (See figure 47, page 47.)

**1. Either or both tensions out of adjustment**

Refer to the instructions for adjustment of tensions (page 46).

**2. Either or both tensions not functioning properly**

*Upper tension.* Clean and polish the inner surface of the tension plates, thereby removing any lint, dirt, oil or rust spots. The plates on some upper tensions cannot be separated for cleaning.

*Lower tension.* This may not be functioning properly due to lint under the tension spring or to an accumulation of lint in the back end of the shuttle. Refer to pages 45 and 46, figures 43 and 44.

### Cloth does not feed through machine

**1. Feed dog does not travel back and forth**

Machine may be set for zero length of stitch. Change stitch length adjustment.

On some machines the feed-dog carrier is moved forward by a spring. The bearings through which the carrier bar slide may contain enough gummed oil and lint to prevent the spring from returning the carrier bar.

Clean the bearings with cleaning fluid. Then oil. Refer to page 26.

**2. Dirt under throat or needle plate and around feed dog**

Clean the feed works. Refer to figures 8, 9, and 10 (pages 11, 12, and 13).

**3. Feed dog too high or too low**

Raise or lower the feed dog so that when it is at its highest point the bottoms of the feed-dog teeth are even with the top of the needle or throat plate. Refer to page 44.

**4. Feed dog release lever or screws in wrong position**

On some of the new machines, there is a feed dog release lever or screw (figures 24, 27, and 29) which may be set in the wrong position. Test for position.

**5. Too much or too little tension on presser foot**

Tighten or loosen the spring by turning the adjustment screw that is on top of the needle-bar housing directly above the presser foot. Refer to page 45.

## Machine skips stitches

1. **Crooked needle**

   Replace the crooked needle with a straight one. Refer to page 41 to test straightness of needle.

2. **Needle too small for thread**

   Replace the needle with one correct in size. Refer to table 1 (page 40). Refer to your instruction book for correct size of needle.

3. **Needle set wrong side out**

   Set the needle so the short groove is on the same side that the shuttle point or hook passes the needle.

4. **Needle incorrectly threaded**

   Pass the thread through the eye of the needle, from the long-groove side to the short-groove side.

5. **Needle set too high or too low**

   In operation when the point or the hook of the shuttle crosses the needle, the point or hook should be just enough above the eye of the needle to pick up the loop of thread. Refer to page 39.

   In all modern machines the needle is set against a stop-pin in the needle bar (page 39). A needle eye too high or too low indicates a needle of the wrong length.

6. **Excess oil on shuttle or on shuttle race**

   Wipe off the excess oil.

7. **Thread-take-up spring too tight**

   Loosen the thread-take-up spring.

## Threads break

### Upper thread breaks

1. **Machine threaded incorrectly**

   The thread should go from spool through various guides, to upper tension, to thread take-up lever, to needle from long groove side to short groove side. Refer to your instruction book.

2. **Needle set too high or too low**

   Adjust as in step 5 under *Machine Skips Stitches* (page 59).

3. **Needle threaded incorrectly**

   Thread as in step 4 under *Machine Skips Stitches* (page 59).

4. **Needle wrong side out**

   Adjust as in step 3 under *Machine Skips Stitches* (page 59).

**5. Needle bent**

Replace a bent needle with a new one.

See that the needle does not rub against the presser foot or the edge of the hole in the needle plate. The adjustments necessary may be: (1) to replace a bent needle; (2) to adjust the presser foot so that its slot is centered over the hole in the needle plate; or (3) on those machines on which the needle-bar housing is removable, to loosen the screws that hold it in place, slide the housing slightly back or ahead, and then tighten the screws. Some machines with a removable needle-bar housing have adjusting screws for the side alignment of the needle also. Refer to your instruction book.

**6. Rough or sharp places on shuttle, or on edge of hole in needle plate, or in needle hole in presser foot or attachment**

Remove the sharp edge or corner with a file or small emery stone. Such edges may tear the thread, especially silk thread.

**7. Needle too fine for thread**

Change the needle. Refer to table 1 (page 40) or to your instruction book for the correct size of needle and thread.

**8. Upper tension much too tight**

Loosen the upper tension.

**9. Not enough clearance for the passage of thread between long shuttle and shuttle carrier**

Refer to page 45.

Move the part necessary to give clearance.

**10. Knot or bad places in thread**

Change the spool of thread.

**11. Take-up spring bent or broken**

Replace with new spring. Refer to page 41.

**Lower thread breaks**

**1. Lower tension much too tight**

Loosen the lower tension.

**2. Shuttle incorrectly threaded**

Thread the shuttle correctly. Refer to your instruction book and (or) page 37 of this bulletin.

**3. Rough or sharp places on edges of hole in needle plate**

Smooth these sharp edges with the corner of a file or a small emery stone.

**4. Bobbin wound too full, unevenly, or loosely**

Remove some of the thread from the bobbin or rewind the bobbin.

**5. Rough places or sharp edges on shuttle or on shuttle-tension spring or on shoulder of bobbin.**

Remove the sharp edge or corner with a file or small emery stone.

**6. Dirt and lint in shuttle cavity**

Remove the shuttle and take out any accumulated lint or dirt. Refer to page 45.

### Stitches loop on bottom of cloth

**1. Machine incorrectly threaded**

Thread the machine correctly as in step 1 under *Upper Thread Breaks* (page 59).

**2. Upper tension much too loose**

Tighten the upper tension.

**3. Thread catches either on a rough place on shuttle or between shuttle carrier and shuttle in long-bobbin or in elevated-bobbin machines**

Determine whether the thread passes freely between the shuttle and the shuttle carrier. If it does not, then adjust the shuttle carrier. Refer to page 45. If it does pass freely between the shuttle and its carrier, look for roughness on some part or parts that contact the thread. Smooth any roughness with a file or emery stone.

**4. A bunch of looped threads under cloth at beginning of stitching**

Pull both threads straight back as shown in figure 36 (page 38).

### Cloth puckers

**Seam Puckers**

**1. One or both tensions too tight causes the cloth to pucker along the seam**

Adjust as directed on pages 46 to 49.

**Side Puckers**

**2. Dull needle**

Change or sharpen the needle. Refer to page 39 and figure 39.

### Stitches are staggered

**1. Too little tension on presser foot**

Tighten the presser-foot spring. Adjust as in step 5 under *Cloth Does Not Feed through Machine* (page 58).

*Figure 56.* **Three types of foot-operated rheostats**

**2. Incorrect action of thread take-up spring**

If the spring is bent out of shape or is broken, replace it with a new one. Refer to page 41.

### Machine sets

If the machine is set, the hand wheel will not turn.

**1. Thread jammed in shuttle, round-shuttle machines only**

Remove the jammed threads.

**2. Thread, lint, dried oil, or dirt in main or other bearings**

Work the hand wheel back and forth. This should loosen the bearings. As soon as they are loosened, wash the bearings vigorously with cleaning fluid while running the machine. When the machine runs freely, wipe off the cleaning fluid. As soon as the bearings are dry, oil the machine.

**3. Needle bent so it strikes the top of the needle plate**

Replace the needle.

### Machine will not run at slow speed (motor-driven only)

**1. Machine binds at some point**

Check for dry bearings, tight bearings, bent needle bar, and threads in working parts.

**2. Rheostat out of order (figure 56)**

Disconnect the motor from the machine and observe whether the motor varies in speed as the rheostat is operated. If the motor does not run at the slower speeds, probably the rheostat has burned out. Have it repaired by a service man or replace it with a new one.

### Stitch length

**1. Length of stitch cannot be changed**

Clean the stitch-changing mechanism, including the feed-dog-carrier bearings. Also, make sure that all lint is cleaned from underneath the needle plate.

### Enamel on machine turns gray

**1. Enamel on machine may turn gray after cleaning with cleaning fluid**

Polish with machine oil and soft cloth.

Revised August 1956

Cooperative Extension Service, New York State College of Agriculture at Cornell University and the U. S. Department of Agriculture cooperating. In furtherance of Acts of Congress May 8, June 30, 1914. M. C. Bond, Director of Extension, Ithaca, New York.